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THE HERPETOLOGY OF PORTO RICO.

BY

LEONHARD STEJNEGER,

Curator, Division of Reptiles and Batrachians.

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ANOLIS KRUGI.

DRAWN BY MISS SIGRID BENTZON FROM A SKETCH FROM LIFE BY THE AUTHOR.

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INTRODUCTION.

The present account of the herpetology of Porto Rico is based primarily upon the collections recently accumulated in the United States National Museum, consisting of about 900 specimens.

Of this large amount of material nearly 350 specimens were collected by Mr. A. B. Baker, of the National Zoological Park, who accompanied the U. S. Fish Commission expedition to Porto Rico during the early part of 1899, and the other naturalists then attached to the *Fish Hawk*.[a]

About 540 specimens were secured in 1900 by Dr. C. W. Richmond and the present writer, who visited Porto Rico and Vieques from February 12 to April 19. This number includes various specimens collected then or shortly afterwards at our request by other persons, among whom may be mentioned Dr. A. Stahl, of Bayamon, Porto Rico; Mr. L. M. McCormick, of New York; Mr. B. S. Bowdish, of New York, and Mr. Charles E. Adams.

It may be added that the National Museum during 1901 employed Mr. B. S. Bowdish for several months in collecting in Porto Rico and Mona Island. The most important result was the discovery of a new species of *Anolis* in Mona.

The trip which I undertook in conjunction with Dr. C. W. Richmond, Assistant Curator of Birds, was primarily for the purpose of collecting specimens characteristic of the West Indian fauna for exhibition at the Pan-American Exposition in Buffalo. It was originally our intention to proceed from Porto Rico to the smaller islands on the east and south, but an attack of fever to which we both fell victims prevented us from carrying out our plans. The fever and the long convalescence also seriously interfered with our work in Porto Rico, so that we lost nearly three weeks collecting.

[a] For an account of this expedition see Dr. B. W. Evermann's General Report on the Investigations in Porto Rico of the U. S. Fish Commission steamer *Fish Hawk* in 1899, in U. S. Fish Commission Bulletin for 1900, pp. 3–25.

Our principal and most important collecting was made in the high and wet region of the El Yunque Mountain, near the eastern end of the island. There, at an altitude of 2,978[a] feet, only about 500 feet below the top, we camped for five days during an almost continuous rain and fog, while an equal length of time was spent on Mr. Agostini's hospitable coffee plantation on the eastern slope of the same mountain, at an elevation of 886 feet. One of the first reptiles I collected there was a fine specimen of the large *Anolis cuvieri*, which seems to be quite rare. In the excessively moist climate near the top, in a tropical forest of palms and tree ferns covered with dripping moss and air plants, while a dense matting of wet begonias concealed the ground reeking with dampness, we collected a large number of tree toads, some of which turned out to be new species. Here also we saw the new species of *Anolis*, the gorgeously emerald green *A. evermanni*, in its greatest glory.

Another new species of *Anolis* we discovered toward the end of our stay in the dry, southern part of the island, in fact, only 3 miles from Ponce, the most important commercial city of the island. The surface of the hills, which rise out of the coastal plain east of the city, is covered with a white, calcareous, marl-like formation, and here we found this species, *Anolis poncensis*, which belongs to the same group of the genus as *A. pulchellus* and *A. krugi*.

Some time was spent in Utuado in a diligent search for Peters's *Anolis gundlachi*, the types of which, now in the museum at Berlin, are said to have been collected at Utuado. We secured only a single young specimen near that town, which is the lowest altitude in which the species seems to occur. In the higher regions of El Yunque and at Adjuntas we found it abundant.

That I only obtained one specimen of *Celestus pleii*, and that we, as well as Mr. Baker and others of the *Fish Hawk* party, entirely failed to secure a single specimen of *Mabuya sloanii* is less extraordinary, for doubtless the scarcity of these purely terrestrial species is due to the mongoose, which now infests the whole island and in places is exceedingly common.

This ferocious little animal is also responsible for the present comparative infrequency of snakes in the island. Formerly snakes were common enough, for as late as 1835 Dr. Moritz found them so numerous that in places one could hardly make a step without seeing sev-

[a] My own aneroid measurements gave for our camp an altitude of 2,863 feet and for the top of El Yunque 3,351 feet. On the latest map of Porto Rico issued by the U. S. Coast and Geodetic Survey (No. 920, December, 1901) the height of El Yunque as obtained by triangulation is given as 1,062 meters, or 3,485 feet, consequently 134 higher than found by me. Accepting the latter altitude as correct, and distributing the error proportionally, the altitude of our camp may be assumed to have been 2,978 feet above sea level.

eral. At present one may traverse the island from one end to the other without getting a glimpse of a single one.

The apparent rarity of the toad (*Bufo lemur*) is probably due less to the mongoose than to its very retired habits and the scarcity of suitable localities. The name *Sapo* is known to the inhabitants, but in most places is misapplied to the *Leptodactylus* and the tree toad. Some even knew the name *Sapo concho*, by which the Porto Rican toad is known specifically because of the shell-like hardness of the bony head covering, but no one seemed able to give us any information which would lead to its discovery. Even a large reward which I offered proved ineffective. Dr. Stahl, who, during a residence of more than forty years, had collected assiduously, and to whom the country people used to bring all the natural curiosities they could find, assured us that he himself had never seen the toad in its native haunts, and that altogether only six specimens had been brought him, so that our prospects of finding it were very slight. Mr. Baker and the Fish Commission party had also failed to obtain a single specimen. We were constantly watching for it, and nearly despaired of getting one but finally decided to spend some time in Arecibo as the most likely place for them to occur. Even here we were on the point of giving up our search for the now almost mythical animal, when on the last night of our stay there, after our baggage was packed for our departure the next morning, I became the happy possessor of five fine specimens, thanks to the zealous and intelligent assistance of Enrique L. Brascoechea, a young Porto Rican of Aguadilla, a United States telegraph operator, and at the time temporarily in charge of the telegraph office in Arecibo.

During this trip I paid special attention to the colors of the living reptiles and batrachians which I collected, and full descriptions were prepared with Ridgway's Nomenclator of Colors in hand for reference. These descriptions will be found in the present account under their proper headings.

The figures illustrating this paper are mostly the work of Mr. R. G. Paine. A few have been drawn by Miss Sigrid Bentzon.

The author wishes to express his obligations to various persons who have assisted in accumulating the material at hand, either directly by collecting part of it or indirectly by assisting him while in Porto Rico.

Thanks are particularly due to the authorities of the U. S. Fish Commission for the use of the magnificent collections made by the *Fish Hawk* expedition, and to Mr. A. B. Baker for the zeal and care displayed in getting together the finest collection of reptiles made up to that time in Porto Rico. I am also under obligations to Mr. Louis McCormick, Mr. B. S. Bowdish, Mr. Charles E. Adams, and Dr. A. Stahl, for specimens collected by them in various parts of the island and presented to the National Museum.

To Prof. Samuel Garman, of the Museum of Comparative Zoology at Cambridge, Massachusetts, I am greatly indebted for the loan of various specimens of Porto Rican reptiles.

To Dr. G. Pfeffer, curator in the Natural History Museum in Hamburg, I am also greatly in debt for the opportunity to examine the Mona Island specimens under his care. Dr. Steinhaus, assistant at the same museum, rendered valuable help during this examination.

I wish specially to acknowledge the assistance received from the military authorities then in charge of the island. Col. John L. Clem, U. S. Army, the chief quartermaster, rendered material help in the matter of transportation, and Lieut. Col. William A. Glassford, U. S. Army, the chief signal officer, has placed us under lasting obligations by his generous and thoughtful assistance in many ways.

Finally, I have to thank my associate, Dr. Charles W. Richmond, for active help and cheerful companionship during an expedition which, though offering but little in the way of excitement and adventure, nevertheless was devoid neither of arduous work nor of hardships of various kinds and degrees.

HISTORICAL REVIEW.

The first attempt at an enumeration of the reptiles and batrachians of Porto Rico is by Mr. Ledru (as he is called on the title-page, or Le Dru, as his name is spelled throughout the book), who accompanied Captain Baudin in 1796 to 1798 on a scientific expedition to Teneriffa, Trinidad, St. Thomas, St. Croix, and Porto Rico, of which he published an account in two volumes in 1810 (see bibliography). The second volume contains what purports to be an account of the reptiles occurring in Porto Rico under the following names: (1) *Lacerta monitor* Gm., (2) *Lacerta strumosa* Gm., (3) *Lacerta sputator* Gm., (4) *Lacerta iguana* Gm., (5) *Lacerta ameiva* Gm., (6) *Lacerta principalis* Gm., (7) *Lacerta rapicauda* Gm., (8) *Coluber colubella* Gm., (9) *Coluber melanocephalus* Gm., (10) *Boa murina* Gm., (11) *Rana ocellata* Lin.-Gm., (12) *Rana arborea* Lin. var Σ Rana Americana rubra Seb., Gm.

This list is only less amusing than that of the birds and need not be taken seriously. Evidently Ledru, who was a botanist, did not bring home any reptilian specimens.[a] He probably made notes of some which he saw and of names which were given him on the island. Consequently it is not worth while to attempt any identification of his names, and no reference is made to them in the synonymies of the species in this paper. To illustrate how worthless the whole account is I may quote his description of the boa, which evidently is meant to be the *Epicrates inornatus*, a species nearly uniform grayish-brown

[a] Reptiles are not mentioned in the summary of the collections brought to France and deposited in the National Museum at Paris. Vol. II, p. 291.

above and slate-gray beneath, but which according to Ledru has the "color on the back agreeably marbled with sea-green; pale and speckled with black on the belly."

The next time we hear of Porto Rican reptiles is in a paper by Dr. C. Moritz,[a] who collected insects for the museum in Berlin during four months in the spring of 1835. On page 375 he presents a few general remarks on the reptiles, of no particular interest except that it appears from his account that snakes were much more numerous at that time than at present, for he speaks of places in which one scarcely could make a few steps without seeing several snakes. That he was not much of a herpetologist is evident from his reference to *Cæcilia*, by which he apparently means either *Typhlops* or *Amphisbæna*.

Long before this time, however, a certain Monsieur Plée had also visited Porto Rico, apparently on his way from New York to Martinique. He sent his specimens from the latter place to the Museum d'Histoire Naturelle in Paris, where the reptiles without any discrimination were all credited to Martinique. *Amphisbæna cæca*, *Anolis cristatellus*, *Anolis pulchellus*, and *Celestus pleii* belong to this category.

With the Danish Virgin Islands so near to Porto Rico, it was quite natural that specimens from the latter should occasionally find their way to the museum in Copenhagen. Thus Reinhardt was enabled, in 1843, to describe the large boa as *Boa inornata*. Later, Mr. Riise, an apothecary in St. Thomas, who collected extensively in the Danish islands, visited Vieques personally and sent a number of Porto Rican specimens about the same time to the Smithsonian Institution and to the museum in Copenhagen. The former came under the notice of Cope, and scattered references to them were made by him in 1862. In the following year Professor Reinhardt and Dr. Luetken published their admirable contributions to the herpetology of the West Indian Archipelago, particularly that of the Danish West Indian Islands (see Bibliography) in which the first list of Porto Rican reptiles and batrachians based on reliable material was published. The list was a very meager one, embracing only one batrachian,[b] four snakes, five lizards, and two turtles, together eleven species, as follows:

1 ? *Hylodes antillensis* (Vieques).
2 ? *Alsophis antillensis* (Vieques).
3. *Alsophis portoricensis*.
4. *Chilabothrus inornatus*.
5. *Typhlops richardii*.

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[a] Arch. Naturg., II, 1836, pp. 373–392.

[b] In their tabular synopsis of West Indian species, Porto Rico is credited with one species of batrachians (Author's separate, p. 7), though by an oversight the species is not indicated in the table. The only batrachian referred to in the text as belonging to Porto Rico is a young *Hylodes* from Vieques doubtfully referred to *H. antillensis* (Author's separate, p. 57).

6. *Anolis cristatellus.*
7. *Anolis pulchellus.*
8. *Anolis stratulus.*
9. *Anolis velifer* (Vieques).
10. *Sphæriodactylus macrolepis* (Vieques).
11. *Emys concinna.*

As the record of the North American *Emys concinna*[a] is based upon two young specimens received from Mr. Riise, who had only a "well-founded idea" that they came from Porto Rico, it may be excluded from the list which thus contains only ten species.

Not long after the publication of Reinhardt and Luetken's list, specimens collected by Mr. George Latimer in Porto Rico were received by the Smithsonian Institution, and reported on by Professor Cope in his Sixth Contribution to the Herpetology of Tropical America.[b] The number of species sent by Mr. Latimer was nine, as follows:

1. *Peltaphryne lemur.*
2. *Cystignathus albilabris* var.
3. *Hemidactylus mabuia.*
4. *Mabuya fulgida.*
5. *Diploglossus degener.*
6. *Anolis velifer.*
7. *Typhlops* sp.
8. *Chilabothrus inornatus.*
9. *Alsophis sanctricrucis.*

At least five of these species are additional to Reinhardt and Luetken's list—namely, the first five—thus bringing the total number of species definitely known from Porto Rico and Vieques in 1868 up to fifteen.

The next addition is in 1871, when *Sphargis coriacea* was added by Dr. Bello y Espinosa.[c] He also mentioned the occurrence of the *Hylodes*, though without identifying it. With this addition the number of species became sixteen.

A decided step forward in our knowledge of the herpetology of Porto Rico was taken when Prof. W. Peters, in 1876,[d] published his paper upon the collections made by the German vice-consul in Mayaguez, Mr. L. Krug, and the well-known zoologist of Habana, Dr. J. Gundlach, who visited the island in 1873 and again in 1875–76.[e] The collections, which are deposited in the Berlin Museum, embraced nineteen species of reptiles and batrachians, of which six were additions

[a] One of the specimens in question seems to be now in the Hofmuseum at Vienna, and is there determined as the Mexican *Pseudemys ornata cataspila.*

[b] Proc. Phila. Acad., 1868, pp. 311–312.

[c] Zool. Garten, 1871.

[d] Monats Bericht Akad. Wiss. Berlin.

[e] Evermann, Invest. Fish. Porto Rico, p. 3.

to the fauna, two being described as new species. The additions, in Professor Peters's nomenclature, are as follows:

1. *Anolis gundlachi.*
2. *Anolis krugi.*
3. *Ameiva plei.*
4. *Amphisbæna cæca.*
5. *Dromicus parvifrons.*
6. *Hylodes martinicensis.*

Total number of species known in 1876 consequently was twenty-two.

The substance of Dr. Peters's paper was republished in 1881 by Dr. Gundlach in the Anales de la Sociedad Española de Historia Natural in Madrid, translated into Spanish, with the addition of two species, namely, the marine turtles *Chelonia viridis* and *Caretta imbricata*, thus bringing the number of species up to twenty-four.

Dr. Agostin Stahl, the venerable patriot and naturalist of Bayamon, Porto Rico, in 1882 published a Fauna de Puerto-Rico, intended mainly as a catalogue of his large collections, but with brief indications of the characters of some of the species. In his list of the reptiles he omits two species, namely, *Mabuya sloanii* and *Hemidactylus mabouia*, though the latter is indicated without name, but a marine turtle is added, namely *Chelonia caretta*, thus increasing the number of species known to twenty-five.

In 1896 Dr. Boulanger, the celebrated herpetologist and icthyologist of the British Museum, reported upon a small collection of reptiles from Mona Island deposited in the museum at Magdeburg, Germany, by Mr. H. Boettcher. It contained but three species, but the *Ameiva* turned out to be an undescribed species which Dr. Boulanger named *A. alboguttata*, raising the number of species to twenty-six.

The twenty-seventh species also comes from Mona Island, being a boid snake, *Epicrates monensis*, described in 1898 from four specimens in the museum at Hamburg, Germany, by Dr. Zenneck. These specimens were collected on Mona Island during 1891 and 1894 by Mr. Ch. Bock, who, at that time, sent the Hamburg museum a large number of specimens of other species from this interesting little island. These were reported upon by Mr. Meerwarth in 1901, who thus was able to add three species, two of which he described as new forms, namely *Hylodes monensis* and *Sphærodactylus macrolepis monensis*, the third being *Metopoceros cornutus*, making a total of thirty species for Porto Rico and dependent islands.

This ends the published records of the batrachians and reptiles in Porto Rico.[a]

The present work increases the number of species to thirty-nine, being an addition of nine species. The number of species described as new

[a] It should be added, however, that in the various important contributions to the West Indian herpetology published by Prof. S. Garman there are frequent references to Porto Rican specimens, but as none of the species so mentioned by him have been additional to the fauna they have not been noticed in the present connection.

is nine, but two of the species here named for the first time have been known as Porto Rican under different names. The new species named in this paper are as follows:

	Page.
Eleutherodactylus richmondi	593
Eleutherodactylus unicolor	597
Sphærodactylus grandisquamis	602
Anolis monensis	646
Anolis evermanni	647
Anolis poncensis	665
Amphisbæna bakeri	681
Typhlops rostellatus	686
Leimadophis stahli	695

Distribution of the species (exclusive of marine turtles) occurring in Porto Rico.

	Species.	Caribbean islands.	Virgin Islands.	Vieques, Culebra.	Porto Rico.	Mona Island.	Haiti.	Cuba.	Jamaica.	Mainland.
1	Bufo lemur	....	....	....	×!	....	....	....	....	
2	Leptodactylus albilabris	....	×	×	×	....	....	....	....	Southern Mexico.
3	Eleutherodactylus auriculatus	....	....	....	×	....	×	×	....	
4	Eleutherodactylus antillensis	....	×	×	....	....	....	....	....	
5	Eleutherodactylus richmondi	....	....	....	×!	....	....	....	....	
6	Eleutherodactylus monensis	....	....	....	....	×!	....	....	....	
7	Eleutherodactylus unicolor	....	....	....	×!	....	....	....	....	
8	Hemidactylus mabouia	×	×	....	×	....	×	×	×	South America, Mexico.
9	Sphærodactylus grandisquamis	....	....	×!	×!	....	....	....	....	
10	Sphærodactylus monensis	....	....	....	....	×!	....	....	....	
11	Mabuya sloanii	....	×	×	×	×	×	....	....	
12	Ameiva exul	....	×	×	×	....	....	....	....	
13	Ameiva alboguttata	....	....	....	....	×!	....	....	....	
14	Celestus pleii	....	....	....	×!	....	....	....	....	
15	Anolis cuvieri	....	×	×	×	....	....	....	....	
16	Anolis gundlachi	....	....	....	×!	....	....	....	....	
17	Anolis cristatellus	....	×	×	×	....	....	....	....	
18	Anolis monensis	....	....	....	....	×!	....	....	....	
19	Anolis evermanni	....	....	....	×!	....	....	....	....	
20	Anolis stratulus	....	×	×	×	....	....	....	....	
21	Anolis krugi	....	....	....	×!	....	....	....	....	
22	Anolis pulchellus	....	×	?	×	....	....	....	....	
23	Anolis poncensis	....	....	....	×!	....	....	....	....	
24	Cyclura cornuta	....	....	....	....	×	×	....	....	
25	Amphisbæna cæca	....	....	....	×!	....	....	....	....	
26	Amphisbæna bakeri	....	....	....	×!	....	....	....	....	
27	Typhlops lumbricalis	×	×	?	×	×	×	×	×	British Guiana.
28	Typhlops rostellatus	....	....	....	×!	....	....	....	....	
29	Epicrates monensis	....	....	....	....	×!	....	....	....	
30	Epicrates inornatus	....	....	....	×!	....	....	....	....	
31	Leimadophis stahli	....	....	....	×!	....	....	....	....	
32	Leimadophis exiguus	....	×	×	....	....	....	....	....	
33	Alsophis portoricensis	....	....	....	×!	×!	×?	....	....	
34	Alsophis antillensis	....	×	×	....	....	....	....	....	
35	Pseudemys palustris	....	....	....	×	....	×	×	×	
		2	12	10	26	9	6	4	3	3

NOTE.—The character ! indicates that the species is peculiar to the island,

RELATIONS AND ORIGIN OF THE PORTO RICAN HERPETOLOGICAL FAUNA.

In analyzing the composition of the Porto Rican herpetological fauna we find that out of a total of thirty-five species (excluding the marine turtles) no less than twenty-one are peculiar, of which fifteen are peculiar to Porto Rico proper and six to Mona.

On the other hand Porto Rico has only 2 species in common with the Caribbean Islands, the same 2 species also ranging over the other larger Antilles. Two more species Porto Rico proper shares with the latter. The rest of the species occur in the Virgin Islands. Porto Rico thus forms with the latter a group characterized by an extraordinarily great proportion of peculiar species.

But while the fauna of Porto Rico, both in itself and in combination with the Virgin Islands, shows a high amount of specialization demonstrating a considerable degree of isolation in time, it must not be imagined that the separation is very deep seated. On the contrary, the affinities with the other Antilles, especially the larger ones to the west, are very close and can readily be traced.

Before doing so we must first dispose of those species which, as shown in the table of distribution of the Porto Rican species, have been found outside of the Antillean islands.

The first of these is the blind snake, *Typhlops lumbricalis*, of which specimens are said to have come from British Guiana. The range of this species embraces almost all the Antilles, and its presence in northeastern South America presents nothing unusual except, perhaps, the circumstance that it has been able to retain its specific integrity over an area so disconnected. But examples of this kind are not rare. The species is further on referred to the category of forms showing South American affinities.

The next species is *Hemidactylus mabouia*. This is one of the most widely distributed geckos and seems to possess an extraordinary capacity for being carried about in cargoes and establishing itself permanently in places where so introduced. It is most likely that this dispersal is effected through the eggs, which are fastened to the objects shipped, rather than by transport of the adult animals themselves. It is now found in South Africa, Madagascar, various parts of South America, Mexico, and several of the West Indian islands. Its introduction into Porto Rico is probably of very recent date, which accounts for its comparative rarity.

The status of the frog, *Leptodactylus albilabris*, is quite different from that of the other species of the fauna. In the Antilles it is restricted to the Virgin Islands, St. Croix, Vieques, and Porto Rico. There is apparently no indigenous species of the genus in the Caribbean chain, the other two which occur in various islands being evi-

dently introduced by man and belonging to widely different South American species. No *Leptodactylus* or related form is found in Haiti, Cuba, or Jamaica. But the most curious feature is that a frog which neither Dr. Boulanger nor I can distinguish from *L. albilabris*, is a native of southern Mexico, State of Vera Cruz, and the Isthmus of Tehuantepec.[a] I know of absolutely no parallel to this extraordinary range, which is inexplicable on ordinary distributional grounds, for certainly it would transgress the boundaries of the probable to suppose either that this species had once covered the whole country between Tehuantepec and the Virgin Islands and become extinct in the intermediate territory, or that there had at any time been a direct connection between the localities mentioned to the exclusion of the large Antilles. Nor can it for a moment be supposed that the species exists in the latter without having attracted attention. No doubt there are many species yet to be discovered in these islands, but *L. albilabris* is not likely to be one of them, for it is one of the commonest, most obtrusive, and most easily caught batrachians wherever it occurs. In suggesting accidental introduction by man I am fully aware that this explanation does not at first appear plausible, as there does not seem to be or to have been any direct route of communication between southern Mexico or Yucatan and Porto Rico or the Virgin Islands, but I offer it as the only possibility I can think of. The wrecking of a vessel with a cargo of logwood or mahogany a hundred years or more ago might account for this remarkable distribution.

Leaving, then, out of consideration the two species whose introduction we ascribe to man, *Hemidactylus mabouia* and *Leptodactylus albilabris*, the herpetological fauna of Porto Rico falls into two groups, namely, the species which have in all probability originally extended their range from northeastern South America and those whose ancestors came from the west, primarily from the present mainland of Central America, and secondarily from the other Great Antilles.

Comparatively few, probably not more than five of the genera inhabiting Porto Rico, point toward South America.

Ameiva is probably of southern origin. The West Indian members of this genus form several minor but fairly well circumscribed groups, indicating that they originated from a secondary evolutional center located in the archipelago. Nevertheless, on the whole they appear to be more closely allied to the types characteristic of northeastern South America than to the Central American forms, those found in Cuba and Jamaica being most divergent, perhaps, from those of the mainland opposite.

The Amphisbænians, judging from the present distribution of the genus, probably also entered from the south, and the blind snakes (*Typhlops*) almost certainly did so.

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[a] Also possibly Yucatan. Ives, Proc. Phila. Acad., 1891, p. 461.

The snakes of the genus *Alsophis*, though forming an almost exclusively Antillean group, nevertheless betray South American relationship, and those of the genus *Leimadophis* in a still higher degree.

The great majority of the Porto Rican species, however, are of decidedly western affinities. Thus the *Bufo*, the various species of *Eleutherodactylus*, the *Mabuya*, the *Celestus*, the two boas and the fresh-water turtle are obviously related to species in the Great Antilles to the west of Porto Rico. The *Anoles* and the *Sphærodactylus* are also allied more intimately to western species. As a matter of fact the most characteristic species of *Anolis*, for instance, *A. cuvieri*, *A. cristatellus*, and the little group represented by *A. pulchellus*, are utterly foreign to the Caribbean islands, and it is quite apparent that the *Anoles* have developed in a secondary evolutional center located somewhere in what is now known as the Greater Antilles.

Compared with the other Greater Antilles the herpetology of Porto Rico is negatively defined by the absence of a great many characteristic forms. This poverty is easily understood, however, when we reflect that Porto Rico is located at the extreme eastern and northern point of the two series of islands, the Greater and the Lesser Antilles, and that at the maximum distance from both the Central American and South American mainland Porto Rico has obtained its fauna by immigration from both directions, and being at the farthest end has received the fewest number of colonists.

The herpetological fauna as here understood, for obvious reasons, embraces only the main island and those of the adjacent islands with which it passed into American possession by the treaty of Paris.

As has been demonstrated, Porto Rico shows great affinity herpetologically to the Virgin Islands, and the two islands belonging to the former, but situated intermediate, Culebra and Vieques, are also intermediate in their fauna to a certain extent. The coronelline snakes, however, and one of the tree-toads occurring in Vieques or Culebra or both are identical with those of the Virgin Islands, differing decidedly from the corresponding species inhabiting Porto Rico proper. This is the more interesting as we know of only one species which occurs both in Porto Rico and Vieques or Culebra and does not also inhabit one or more of the Virgin Islands, viz, *Sphærodactylus grandisquamis*.

The little island of Mona, on the other hand, is situated between Porto Rico and Haiti. Thus far not less than nine species are known to occur there, namely:

1. *Eleutherodactylus monensis.*
2. *Sphærodactylus monensis.*
3. *Mabuya sloanii.*
4. *Ameiva alboguttata.*
5. *Anolis monensis.*
6. *Cyclura cornuta.*

7. *Typhlops lumbricalis.*
8. *Epicrates monensis.*
9. *Alsophis portoricensis.*

These also show a mixture of types. *Alsophis portoricensis* is typical Porto Rican; *Sphærodactylus monensis*, *Ameiva alboguttata*, and *Anolis monensis*, although described as separate forms, are very closely allied to Porto Rican species; *Mabuya sloanii* occurs both in Porto Rico and Haiti; *Eleutherodactylus monensis* and *Epicrates monensis* are most nearly related to Haitian species, while *Cyclura cornuta* is typically Haitian, the genus even being unknown in Porto Rico; *Typhlops lumbricalis* is of wide distribution, as shown above. The herpetological fauna of Mona is consequently exactly intermediate between Porto Rico and Haiti, as is its geographical position.

The herpetological relations of Porto Rico to the Virgin Islands immediately to the east is very close, as might be expected, located, as they are, within sight of each other and on the same bank limited by the 100-fathom line. St. Croix, which is separated by a deep channel from the others, is also more distantly related, possessing, as it does, several species not found in the Virgin Islands proper, much less in Porto Rico, namely, *Thecadactylus rapicauda* (possibly accidentally introduced), *Anolis acutus*, *Ameiva polops*, and *Alsophis sancti-crucis.*

If we compare the fauna of Porto Rico with that of St. Thomas and St. John more in detail, we will find that the chief difference lies in the absence in the latter of a great number of species occurring in the former, as will be seen from the following:

List of Porto Rican species (a) not found in St. Thomas or St. John.

1. *Bufo lemur.*
2. *Eleutherodactylus auriculatus.*
3. *Eleutherodactylus richmondi.*
4. *Eleutherodactylus unicolor.*
5. *Sphærodactylus grandisquamis.*
6. *Celestus pleii.*
7. *Anolis cuvieri.*
8. *Anolis gundlachi.*
9. *Anolis evermanni.*
10. *Anolis krugi.*
11. *Anolis poncensis.*
12. *Amphisbæna cæca.*
13. *Amphisbæna bakeri.*
14. *Typhlops rostellatus.*
15. *Epicrates inornatus.*
16. *Leimadophis stahli.*
17. *Alsophis portoricensis.*

It will be seen that the existence of many of these species in Porto Rico is not due solely to the fact that it is much the larger island, but also to its more western location and more intimate relation to the other large Antilles. On the other hand, some of the species in this list are represented in the Virgin Islands by very closely related forms.

(a) Excluding those found in Mona Island.

The number of species occurring in St. Thomas and St. John but not in Porto Rico proper are very few, as shown in the following:

List of species occurring in St. Thomas (a) and St. John but not in Porto Rico proper.

1. *Eleutherodactylus lentus.*
2. *Eleutherodactylus antillensis.*
3. *Sphærodactylus macrolepis.*
4. *Iguana iguana.*
5. *Amphisbæna fenestrata.*
6. *Leimadophis exiguus.*
7. *Alsophis antillensis.*

It will be seen in every case but one that these represent species living in Porto Rico, and, moreover, that three of them extend so far west as to include Vieques and Culebra, namely, *Eleutherodactylus antillensis*, *Leimadophis exiguus*, and *Alsophis antillensis*. The only species which is not represented at all in Porto Rico is *Iguana iguana*, and it is altogether probable that this species has been introduced originally by man.

As an offset to the three peculiar Virgin Island species mentioned above, which extend as far west as Vieques, we may mention for the sake of completeness a Porto Rican species which reaches Tortola, but which has not been recorded from St. Thomas or St. John, namely, *Anolis cuvieri*.

It is then plain that the sixteen species of reptiles and batrachians found in St. Thomas and St. John[b] form only a herpetological appendix to Porto Rico.

VERTICAL DISTRIBUTION.

With regard to the vertical distribution of the batrachians and reptiles in Porto Rico it must be borne in mind that the island, although very mountainous, does not rise to such great altitudes as the other Greater Antilles. The El Yunque Mountain, which has been considered the highest point in Porto Rico, has lately been determined to be

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[a] Only such species are included the occurrence of which is corroborated by repeated finds, and consequently undoubted.

[b] 1. *Leptodactylus albilabris.*
2. *Eleutherodactylus antillensis.*
3. *Eleutherodactylus lentus.*
4. *Thecadactylus rapicauda.*
5. *Hemidactylus mabouia.*
6. *Sphærodactylus macrolepis.*
7. *Mabuya sloanii.*
8. *Ameiva exul.*
9. *Anolis cristatellus.*
10. *Anolis stratulus.*
11. *Anolis pulchellus.*
12. *Iguana iguana.*
13. *Amphisbæna fenestrata.*
14. *Typhlops lumbricalis.*
15. *Leimadophis exiguus.*
16. *Alsophis antillensis.*

A number of species credited to St. Thomas on the strength of uncorroborated museum labels is here left out. It is not unusual that museum specimens are credited to the place from which they were shipped, which may have been another than the one in which they were collected. On the other hand, single specimens accidentally introduced from near-by islands may well be expected in a place like St. Thomas.

only 3,485 feet. Nevertheless, there are several species which are confined either to the lowlands or to the mountains respectively, while others range over the whole territory, from sea level to the highest peaks. The elevations reached by the batrachians and reptiles vary to a great extent locally, depending, as they do, on the climatic conditions. Consequently, the species inhabiting the higher altitudes descend lower on the northern slope of the great mountain chains which traverse the island from east to west, and the lowland species ascend higher on the southern slope.

Only a single species ranges all the way from sea level to the highest mountain tops, namely, the tree toad, or coquí (*Eleutherodactylus auriculatus*).

On the other hand, about ten species are confined to the lowlands, some never reaching, others very seldom ascending, beyond 500 feet. In this category fall the following species:

Bufo lemur.
Hemidactylus mabouia.
Sphærodactylus grandisquamis.
Mabuya sloanii.
Ameiva exul.
Anolis pulchellus.
Anolis poncensis.
Typhlops lumbricalis.
Alsophis portoricensis.
Pseudemys palustris.

A few species reach well into the coffee belt, though it is doubtful whether they go much beyond 1,000 feet altitude, namely:

Anolis cuvieri.
Amphisbæna cæca.
Epicrates inornatus.
Leimadophis stahli.

Others, again, we know to range from sea level to about 1,500 feet, such as—

Leptodactylus albilabris.
Anolis cristatellus.
Anolis stratulus.

Among the species which do not descend to sea level there are a few confined to intermediate altitudes. These range between about 500 and 1,500 feet, though the blind snake and the blind lizard probably do not reach much higher than 1,000 feet. They are:

Celestus pleii.
Anolis krugi.
Amphisbæna bakeri.
Typhlops rostellatus.

Two species we have found occupying all the zones from an average altitude of, say, 500 feet to the highest mountain tops, namely:

Anolis gundlachi.

Anolis evermanni.

One batrachian which also reaches the highest elevations but which scarcely descends below 800 feet is *Eleutherodactylus richmondi.*

Finally a single species, thus far only known from one specimen, appears to be confined to the tops of the mountains, about 3,000 feet altitude, viz: *Eleutherodactylus unicolor.*

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Reptiles of Porto Rico, pp. 290–292.

With regard to the year of the publication of this edition it is to be noted that while it is given as 1812 on the title page the folding map at the end of the book is dated 1814. It is consequently probable that the book was not issued until the latter year.

1836. Moritz, C. Notizen zur Fauna der Insel Puertorico. Wiegmann's Archiv für Naturgeschichte, 1836, ii, pp. 373–392.

1863. Ledru, Andres Pedro. Viage | a la | isla de Puerto-Rico | en el año 1797, | ejecutado por una comision | de sabios Franceses, | de órden de su gobierno | y bajo la direccion del capitan | N. Baudin, | con objeto de hacer | indigaciones y colecciones | relativas a la | Historia Natural; | conteniendo observaciones sobre el clima, suelo, | poblacion, agricultura, comercio, carácter y | costumbres de sus habitantes: | por Andres Pedro Ledru, | uno de los naturalistas de la expedicion, miembro de la Socie-

dad | de las artes de Mans, de la Academia Céltica de Paris, del Mu- | seo de Tours, y ex-Profesor de Legislacion en la Escuela central | de la Sarthe. | Traducido al Castellano | por D. Julio L. de Viscarrondo. | Puerto-Rico. | Imprenta Militar de J. Gonzales. | 1863. One vol., 8 vo., pp., 268.

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Various references to Porto Rican reptiles and batrachians throughout this excellent paper. A list of the species then known from Porto Rico is included in the tabular synopsis, pp. 156–177.

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On pp. 311–312 is a list of reptiles collected by George Latimer in Porto Rico.

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1876. Peters, W. Ueber eine von Hrn Viceconsul L. Krug und Dr. J. Gundlach auf der Insel Puertorico gemachte Sammlung von Saeugethieren und Amphibien, so wie ueber die Entwickelung eines Batrachiers, *Hylodes martinicensis* Dum. Bibr., ohne Metamorphose. Mon. Ber. Berlin Akad. Wissensch., 1876, pp. 703–714 + pl. i.

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This is the title on the cover. The inside title is as follows:—Catálogo | del | Gabinete Zoológico | del | Dr. A. Stahl, | en Bayamon (Pto-Rico.) | Precidido de una clasificacion sistemática | de los animales que corresponden á esta fauna. | [Vignette] Puerto-Rico. | Imprenta del "Boletin Mercantil" | 37.—Fortaleza—37. | 1882. 8 vo. 249 pp.

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1901. Meerwarth, Hermann. Die Westindischen Reptilien und Batrachier des Naturhistorischen Museums in Hamburg. Mittheil. Naturhist. Mus. Hamburg, XVIII, pp. 1–41 + pls. i–ii.

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BATRACHIANS AND REPTILES OF PORTO RICO.

Custom and practical considerations account for the batrachians and reptiles still being treated of together, though it has been demonstrated long ago and now universally admitted by naturalists that they constitute separate classes, more nearly related perhaps to the birds on the one hand and to the fishes on the other than among themselves. The nonscientific public, however, can not be blamed for confounding the two classes, especially since the distinguishing characters are chiefly anatomical, and it is consequently the more necessary that their distinctness be insisted on and emphasized whenever the herpetologist, whose studies embrace both, addresses himself to this public. As it is among the objects of the present work to afford those who have not given special attention to this study a ready means of identifying the "creeping" animals of Porto Rico, it may not be out of place here to mention that the members of the two classes occurring there can be distinguished by external characters as follows:

I. *Batrachia.*—Body covered with a soft skin and not incased in a bony shell.

II. *Reptilia.*—Body covered with horny scales and plates, or incased in a bony shell, with a horny or leathery covering.

Class BATRACHIA.

Of the three orders composing the living batrachians only one, namely, the *Salientia*, or tailless batrachians, is represented in Porto Rico. This order, usually known as frogs and toads, again falls into three suborders, of which Porto Rico also has representatives in only one, namely, the *Linguata*, that is, those with tongue but no ribs. Two families with three genera comprise the Porto Rican fauna and may be distinguished as follows:

KEY TO THE BATRACHIANS OF PORTO RICO ACCORDING TO GENERA.

a^1 No teeth; a large gland (parotoid) on each side of neck; skin very rough, warty (*Bufonidæ*) ..... *Bufo*, p. 569.

a^2 Maxillary and vomerine teeth; no parotoid gland; skin more or less smooth (*Leptodactylidæ*).

b^1 Tip of fingers not dilated, tapering ..... *Leptodactylus*, p. 574.

b^2 Tip of fingers dilated into regular disks ..... *Eleutherodactylus*, p. 582.

Genus BUFO[a] Laurenti.

1768. *Bufo* Laurenti, Synops. Rept., p. 25 (type *B. vulgaris*).

1788. *Buffo* Lacépède, Hist. Nat. Quadr. Ovip. Serp., I, Syn. meth. (emend.).

1814. *Batrachus* Rafinesque, Specchio d. Sci., (Palermo) II, fasc. 7 (substit.).

[a] Latin, =toad.

1815. *Bufotes* Rafinesque, Anal. Nat., p. 78 (emend.).
1816. *Calamita* Oken, Lehrb. Zool., II, p. 209 (type *B. calamita;* not of Schneider 1799).
1828. *Chascax* Ritgen, Nova Acta Acad. Cæs. Leop., p. 278 (type *B. strumosus*).
1843. *Phryne* Fitzinger, Syst. Rept., p. 32 (type *B. vulgaris*).
1843. *Docidophryne* Fitzinger, Syst. Rept., p. 32 (type *B. agua*).
1843. *Peltophryne* Fitzinger, Syst. Rept., p. 32 (type *B. peltocephalus*).
1843. *Chilophryne* Fitzinger, Syst. Rept., p. 32 (type *B. d'orbignyi*).
1862. *Peltaphryne* Cope, Proc. Phila. Acad., 1862, pp. 344, 627 (emend.).
1868. *Otaspis* Cope, Proc. Phila. Acad., 1868, p. 312 (type *O. empusa*).
1875. *Cranopsis* Cope, Journ. Phila. Acad., (n. s.) VIII, Pt. 2, p. 96 (type *C. fastidiosus*).
1889. *Cranophryne* Cope, Bull. U. S. Nat. Mus., No. 34, p. 260 (substit.).

The above synonymy only embraces such names as are additional to previously published lists or directly referable to the group to which the Porto Rican species belongs.

The toads (Spanish *Sapo*) with their warty skin are so well known that a generic description seems superfluous in this connection.

Only one species of this numerous and almost cosmopolitan genus is found within our territory, though a second one has been reported upon insufficient or erroneous evidence.

BUFO LEMUR[a] (Cope).

1868. *Peltaphryne lemur* Cope, Proc. Phila. Acad., 1868, p. 311 (type locality, Porto Rico).
1876. *Bufo* (*Peltaphryne*) *gutturosus* Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 709 (Porto Rico, Bayamon, Vegabaja) (not of Latreille 1802).—*Bufo g.* Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 314 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 71, 161 (Porto Rico).—Garman, Bull. Essex Inst., XIX, 1887, p. 16 (part, specimens from Bayamon, Porto Rico).

This species has been united by Peters with a related one from Santo Domingo, a conclusion since adopted by Boulenger and Garman. Though having no specimens from Santo Domingo for direct comparison, I venture to disagree with them, as Boulenger's own description[b] and Günther's figure[c] of Santo Domingan specimens show characters sufficient to separate the two species, as, for instance, the vastly greater development of the cephalic crests, the horizontal expansion of the upper jaw into a labial crest, the presence of a parietal crest, and of a prominent subnasal ridge. The Porto Rican specimens also have single conical tubercles under the digital articulations, while the Santo Domingan ones are said by Boulenger to have toes "with double subarticular tubercles."

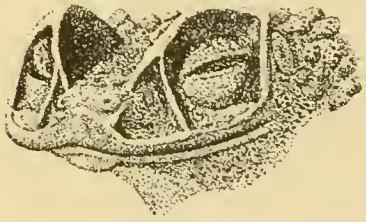
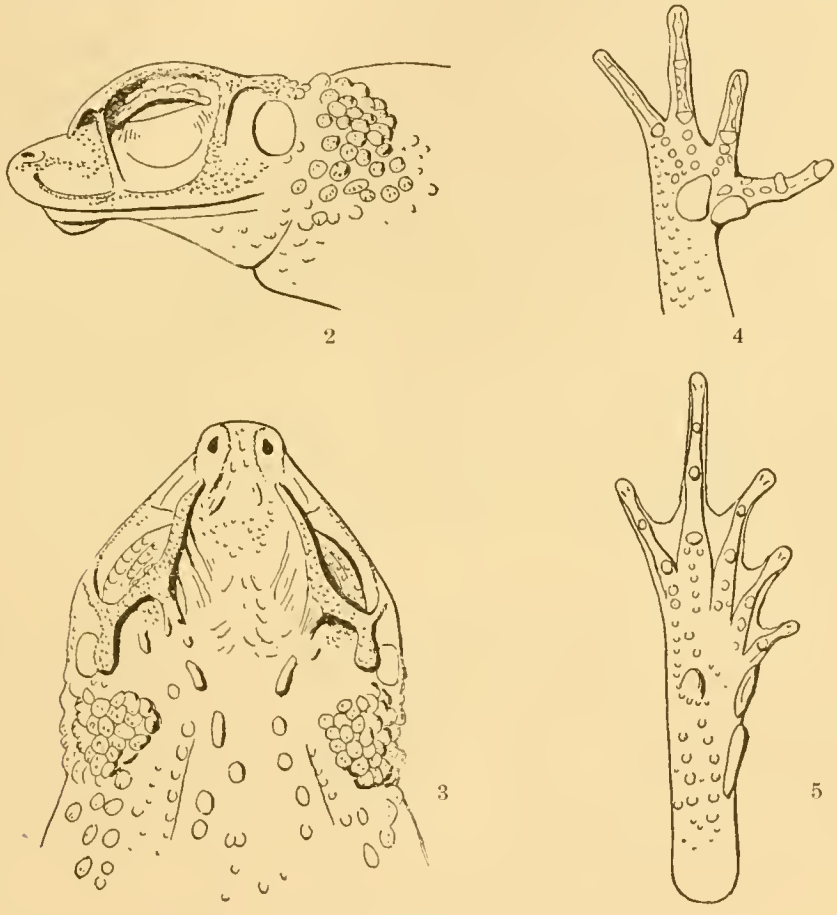


Fig. 1.
BUFO LEMUR. HEAD.
No. 27148, U.S.N.M.

[a] Lemur, a genus of mammals of nocturnal habits.
[b] Cat. Batr. Sal. Brit. Mus., 1882, p. 324.
[c] Cat. Batr. Sal. Brit. Mus., 1858, pl. v, fig. *B*

Description of adult.—U.S.N.M. No. 27148; Arecibo, Porto Rico; April 4, 1900; L. Stejneger, collector. Top of head bony, with enormous crests inclosing a deep hollow between the orbits, the height of the supraorbital crest being about 7 mm. above the interorbital space and 3 mm. above the eyelid; the orbital crest originates on the canthus rostralis extending backward in a great arch to behind the eye, from which point a similarly high supratympanic crest projects backward, ending in a rounded knob; from the supraocular crest a lower anteorbital ridge and a higher postorbital crest descend toward the edge of the upper jaw, joining there the high supralabial crest, which



FIGS. 2–5.

BUFO LEMUR.

Natural size; 2, side of head; 3, top of head; 4, underside fore foot; 5, underside hind foot.

No. 27148, U.S.N.M.

extends from below the nostril to the juncture with the postorbital crest; from the inner side of the supraorbital crests a low parietal spur proceeds obliquely toward the occiput, not as a continuous crest, but broken up into several ridges and knobs; snout prominent; lores deep; eyes sunk deep in a large squarish socket; upper lip expanded horizontally as a bony crest several millimeters wide; tympanum elliptically erect, its horizontal diameter scarcely one-half the width of the eye; parotoid gland large, descending behind the ear, but not of very distinct outline, as it is densely covered with large conical warts, each

one with numerous blackish spines; first finger slightly shorter than second; toes less than one-half webbed; subarticular tubercles conical, single; two well-developed metatarsal tubercles; a strong fold on distal half of tarsus; a large gland near outer edge of tibia; back and sides covered with numerous conical warts like those on parotoid glands, though smaller and only with one blunt spine on the middle of the lower back; whole lower surface with flatter, one-pointed warts; upper surfaces of hands and feet nearly smooth.

Dimensions.

	mm.
Tip of snout to vent	83
Tip of snout to posterior edge of tympanum	29
Greatest width of head	32
Fore leg from axilla	51
Hind leg from vent	99

Coloration of living specimens.—U.S.N.M. No. 27148 (L. S. No. 9058). Iris pale brassy, sprinkled with black. General color above dull clay-colored with a strong olive wash; blackish brown markings and an ill-defined hourglass-shaped mark between shoulders; also a larger blackish spot on each side of the coccyx, which is marked by a pale streak; indications of blackish cross bands on legs; underside dirty white, becoming flesh-colored behind and strongly reddish flesh color on underside of femur and nearest portion of belly; tips of toes dark brown; tips of warts on back black, those between shoulders particularly large.

Another specimen (No. 27149) was colored as follows: Upper side olive, strongly suffused with "gallstone yellow," which is particularly noticeable over the insertion of the fore limbs; very few traces of dusky markings, but the pustules are black, especially anteriorly; an intensely ochraceous-rufous spot on the middle of the back; on the underside the yellow suffusion invades the white ground-color on the portion nearest to the flanks.

The third large specimen (No. 27150) was quite similar to the last, though without any rufous spot on the back, which seems to be an anomaly. Whole upper surface darker olive, and flanks, including space at base of fore limb and below the ear, more intensely and more well-defined yellow; underside dirty yellowish white.

A young specimen (No. 27151) was colored as follows: General color above drab, more isabella-colored on head; dark markings blackish, those on shoulders pale-edged externally; flanks with a purplish suffusion and indications of a broad longitudinal band, well-defined and pale-edged above, but gradually fading below into the pale isabella color of the belly; underside with a network of coarse dark-gray mottlings and marblings.

Habitat.—The toad seems to be somewhat rare in Porto Rico, possibly because of lack of suitable localities. Dr. Stahl informed me

that during all his forty years of collecting in the island he had never come across it himself, and the six specimens which in that time he had obtained were brought to him by the peasants as curiosities. Neither Mr. Baker nor any of the Fish Commission parties saw it, and for a long while all the inquiries of Dr. Richmond and myself were unavailing. The natives knew the name "Sapo concho," but when told to bring specimens they invariably handed in some *Eleutherodactylus* or *Leptodactylus*. A rumor had it that a certain druggist in Arecibo many years ago had had a specimen on exhibition in his store, and consequently we at last repaired to that city as a last resort. The druggist was found and corroborated the rumor, but the specimen had long since disappeared. We made diligent inquiries in the neighborhood through our young friend Mr. Enrique L. Brascoechea, and finally, as we had almost given up hope, he found an old beggar who remembered a place where as a boy he had seen the sapos. He was promised a substantial reward, and on the last evening of our stay in Arecibo brought in five fine specimens captured about 3 miles south of the town. He said he had found them in holes under the roots of palm trees at the border of a fresh-water pond, where they keep in hiding during the day.

Bufo lemur is the only toad found in Porto Rico, and is not known from any other island. In Vieques we were informed that the "Sapo concho" occurs, but we failed to obtain specimens, although we made special efforts and offered a high reward for specimens.[a]

List of specimens of Bufo lemur.

U.S.N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
27148	Adult.....	Arecibo, Porto Rico..	Apr. 4, 1900	L. Stejneger..	Described and fig., p. 571.
27149	.....do.....	.....do.....	.....do.....	.....do.....	
27150	.....do.....	.....do.....	.....do.....	.....do.....	
27151	.....do.....	.....do.....	.....do.....	.....do.....	
27152	Half grown.	.....do.....	.....do.....	.....do.....	

[a] *Bufo marinus* (Linnæus), which occurs in many West Indian islands, probably introduced, is only mentioned here, because Reinhardt and Luetken write (Vid. Meddel. Naturhist. Foren., 1862, p. 202; author's reprint, p. 50, footnote) that it is occasionally brought to St. Thomas with lumber from "Vieques and Hayti." There is no reason to believe, however, that the reported origin of these imported toads is correctly given by their informant in so far as Vieques is concerned. *Bufo marinus* is a very large species with enormous triangular parotoid glands, which are nearly smooth.

Genus LEPTODACTYLUS[a] Fitzinger.

1826. *Leptodactylus* Fitzinger, Neue Class. Rept., p. 38 (type *Rana typhonia*).
1830. *Cystignathus* Wagler, Nat. Syst. Amph., p. 202 (type *Rana pachypus*).
1865. *Gnathophysa* Cope, Nat. Hist. Review, 1865 (p. 112) (type *Rana labyrinthica*).

Although not a frog in a strictly scientific sense, the *Leptodactylus* counterfeits the external appearance of the true frogs to perfection, and the one living in Porto Rico will probably always be known to the English-speaking people there as the frog, as it has always been known to the Spanish population by the name of "Rana."

Only one species occurs in Porto Rico and dependent islands, possibly originally introduced through the agency of man, as elsewhere suggested in this work (p. 562). The genus is tropical American.

LEPTODACTYLUS ALBILABRIS[b] (Guenther).

1859. *Cystignathus albilabris* Guenther, Ann. Mag. Nat. Hist., (3), IV, p. 217 (type locality, St. Thomas, W. I.; types in Brit. Mus.; Riise coll.).—Reinhardt and Luetken, Vid. Meddel. Naturh. Foren. (Copenhagen) 1862 (1863), p. 205; reprint, p. 53 (St. Thomas, St. Croix, Just van Dyck).—*Leptodactylus a.* Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 245, pl. xvi, fig. 4.—Boettger, Kat. Batr. Samml. Mus. Senckenberg., 1892, p. 31 (Porto Rico).
1868. *Cystignathus albilabris* var. Cope, Proc. Phila. Ac., 1868, p. 311 (Porto Rico).
1876. *Cystignathus typhonius* Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 709 (Porto Rico) (not of Daudin).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 313 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 71, 161 (Porto Rico).
1877. *Cystignathus labialis* Cope, Proc. Amer. Philos. Soc., XVII, 1877, p. 90 (type locality uncertain, probably Mexican); XVIII, 1879, p. 270 (Tehuantepec and Potrero, near Cordova, Vera Cruz).

Like Boulenger, I have compared Tehuantepec specimens, Cope's *C. labialis*, with the Antillean series, without being able to discover any tangible difference upon which to base a separation. To prove that there is no difference whatever in proportions I submit the following measurements, carefully taken from two individuals of identical size:

Measurements.

	No. 27765 U.S. N.M., Tehuantepec, Mexico, Sumichrast collection.	No. 27750 U.S. N.M., Aguadilla, Porto Rico, Bowdish collection.
	Mm.	*Mm.*
Total length	34.00	34.00
Eye to nostril	3.50	3.50
Diameter of tympanum	2.50	2.25
Axilla to groin	12.00	12.00
Fore leg	17.50	18.00
Hind leg from vent to tip of longest toe	53.00	53.00
Hind foot from outer metatarsal tubercle to tip of longest toe	16.00	16.00

[a] λεπτός, slender; δάκτυλος, digit. [b] *Albilabris*=with white lips.

Whether Brocchi's *Leptodactylus caliginosus*[a] really belongs here is somewhat more doubtful. The figure does not much resemble this species, nor does the description mention the conspicuous white labial stripe. Bocourt's observation that the voice of the species collected by him at Isabal and at Pansos resembles the baying of a dog and may be rendered by the syllable *rhouap! rhouap!* is also at variance with my own experience with *L. albilabris* in Porto Rico.

Description of adult.—U.S.N.M. No. 27084; Isabella Segunda, Vieques Island, March 24, 1900; L. Stejneger, collector. Vomerine teeth in two curved series behind the choanæ; tongue large, slightly indented behind; nostrils nearer the tip of snout than the eye; tympanum circular about two-thirds the diameter of the eye; interorbital space equals width of upper eyelid; first finger much longer than sec-

FIGS. 6–10.—LEPTODACTYLUS ALBILABRIS. 2 × natural size. 6, side of head; 7, top of head; 8, inside of mouth; 9, underside of fore foot; 10, underside of hind foot. No. 27084, U.S.N.M.

ond, which equals fourth; toes slightly webbed at base; third much longer than fifth; subarticular tubercles well developed and numerous smaller tubercles in series on the sole; two metatarsal tubercles, the inner connected with a slight tarsal fold; heels overlapping when hind limbs are folded at right angles to axis of body; tarso-metatarsal joint reaching tympanum when hind limbs are carried forward along the body; skin smooth above and below; numerous small, pointed tubercles on the outer surface of the tibia; a narrow dorso-lateral glandular fold and another similar one, though less pronounced, on sides from shoulder to groin; a strong glandular fold from posterior angle of eye over tympanum to shoulder; ventral disk plainly marked by two transverse dermal folds, one between the fore limbs, the other across the belly, these joined by a longitudinal dermal fold on each side.

[a] Miss. Sci. Mex., Batr., 1881, p. 17, pl. v, figs. 1*a–c*, but not of Girard.

Dimensions.

	mm.
Tip of snout to vent	144
Tip of snout to posterior edge of tympanum	15
Greatest width of head	15
Fore legs from axilla	20
Hind leg from vent to heel	31
Hind leg from vent to tip of longest toe	57

Coloration of living specimens.—Adult; U.S.N.M. No. 26820; L. S. No. 9043; Mameyes, Porto Rico, March 3, 1900. General color above olive, the dusky markings dark grayish brown, nearly blackish brown below the dorso-lateral fold and on femur; the dorso-lateral fold and narrow edges around the dark markings pale olive gray; the trans-ocular band and cutting edge of lip dark grayish brown; the supra-labial light band pale straw yellow; underside whitish; throat finely sprinkled with dark chocolate brown; iris olive silvery, overlaid with blackish.

Another adult specimen, same locality and time (U.S.N.M. No. 26821, L. S. No. 9044), had the general color a little more clayey and the dark markings darker and arranged longitudinally. (In alcohol the middle line of the back becomes quite light, forming a pale median band from between eyes to vent, bordered on both sides by a blackish line.)

Young.—U.S.N.M. 26894; L. S. No. 9040; Catalina plantation, about 890 feet altitude; March 1, 1900. Above clay-colored, becoming darker posteriorly and on sides below the dorso-lateral fold which, like the warts on the sides and a few on the back, is copper colored, the fold being edged with dusky below; a broad cream-colored band from tip of snout under eye and tympanum to arm, bordered above and below by very distinct black lines, the upper one through nostril, eye, and tympanum, the lower margining the upper lip; the light labial band is continued as upper side of the arm, which is slightly more brownish, and the black band below also continues halfway down to the elbow; a black mark in the groin; hind limbs pale olive, barred with black; posterior surface of femur with a conspicuous longitudinal streak of silvery white, margined with black; iris golden, overlaid with black.

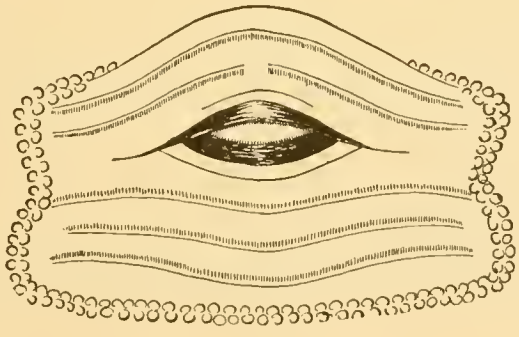
In a large lot (56) of specimens from Vieques (U.S.N.M. Nos. 27084 to 27139; L. S. No. 9052; March 24, 1900), of all sizes, there is a great amount of individual variation in color. The ground color of the back varies between reddish brown through various shades of brown and olive to olive green and even olive yellow, mostly with dusky markings and mottlings between the dorso-lateral folds, though often quite uniform, especially when the ground color is more or less olive. The light labial line is variously developed, but nearly always plainly indicated. The dusky markings on the back show no tendency to

become longitudinal streaks, as is commonly the case in Porto Rican specimens.

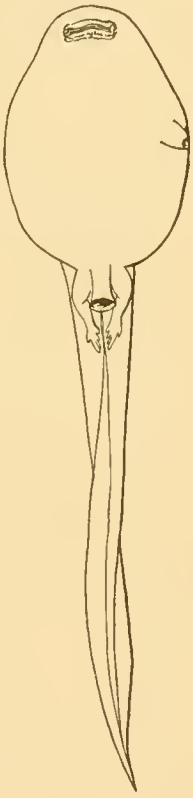
Description of tadpole.—U.S.N.M. No. 26895; Catalina plantation, Porto Rico, about 900 feet altitude; March 1, 1900, L. Stejneger, collector. Length of body about once and one-third its width and slightly less than one-half the length of the tail; nostrils nearer the eyes than the end of the snout; distance between eyes one-fifth more than distance between the nostrils, and considerably less than width of mouth; distance between nostrils equals their distance from eyes, as well as the diameter of the eyes; spiraculum on left side, directed backward and upward, situated above a line drawn between the base

11

12



14



13

FIGS. 11–14.—LEPTODACTYLUS ALBILABRIS, tadpole. 11, lateral view; 12, dorsal view; 13, ventral view. 2 × natural size. 14, mouth, 20 × natural size.

of the muscular part of the tail and the mouth, and nearer to the posterior extremity of the body, being about halfway between anterior border of eye and insertion of hind legs; anus a long tube, median and larger than the spiraculum; tail about four times as long as deep, ending in an obtuse point; both upper and lower crests confined to the tail and nearly equal in depth, their edges being nearly parallel until the terminal third; the depth of the muscular part of the tail at its base about two-thirds the greatest total depth.

Beak white with black edges, the cutting edges plainly denticulated like the dental rows; lips with a double row of papillæ except on the median half of the upper lip, the sides forming an inward fold; the series of labial teeth $\frac{2}{3}$, all equally long and occupying the whole width of the lips; the first upper series narrowly interrupted in the middle, the others uninterrupted.

Lines of muciferous ducts rather indistinct in this specimen. They are better developed in the specimens of No. 27234, taken by me at Utuado on April 9, 1900, especially in 27234*d*, which shows also the lateral lines. Two lines start on the head; one between the nostrils, the other near the corner of the mouth, converging backward above and below the eye and meeting a short distance behind the latter; from this point they diverge again toward the tail; from the eye a short line of crypts descends a short distance in a vertical direction; a lateral line begins above the anterior end of the spiraculum and curving above the latter is lost above the insertion of the hind limbs.

Color (in alcohol) dusky olive gray on back, underside and tail whitish, the latter more or less irregularly marbled and mottled with dusky.

Dimensions of largest tadpole (No. 26895):

	mm.
Length of body	15
Length of tail	31
Width of body	11
Distance between nostrils	2
Nostril from eye	2
Distance between eyes	2.5
Diameter of eye	2
Width of mouth	3.5
Greatest depth of tail	7
Depth of muscular part of tail at its base	4.5

The total length of the largest adult animal being 144 mm., it is consequently a little more than three times as large as the largest tadpole.

Habitat.—The frog—as we may well call the *Leptodactylus albilabris* on account of its exceedingly frog-like aspect—is found all over Porto Rico and Vieques near streams and in marshy places, except in the highest altitudes. It has been found as high up as Adjuntas (about 1,400 feet altitude) by Mr. Baker, but it is doubtful whether it ascends above the coffee belt. On the northern and eastern side of El Yunque Mountain Dr. Richmond and I did not see it much above the Catalina plantation, or about 900 feet altitude.

Habits.—The breeding season of this frog seems to be early in the year, as we found a young one with the tail still unabsorbed on February 20. Full-grown tadpoles were also observed at the Catalina plantation on March 1. In a little stream behind the town of Utuado, on April 7, I not only obtained tadpoles in all stages, but also observed

the remarkable foamy "nest" of this species, with numerous small black larvæ just hatched. In raising a large flat stone in the shallow stream I found a compact ball of snowy foam of a somewhat gelatinous consistency. The ball was about 70 mm. in diameter, and through the center there extended a canal about the width of a finger. In this hollow the blackish larvæ were located.

The voice of this species is fairly loud for its size, and can be expressed by the word "pink" in frequent succession.

List of specimens of Leptodactylus albilabris.

U. S. N. M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
25546	Adult ..	Lares, Porto Rico	Jan. 26, 1899	A. B. Baker	
25547	....do ...	.....do	.....do	.....do	
25548	....do ...	.....do	.....do	.....do	
25607	Young..	Adjuntas, Porto Rico.....	Jan. 29, 1899	.....do	
25628	Adult ..	Aguas Buenas, Porto Rico....	Jan. 12, 1899	.....do	
25629	....do ...	.....do	.....do	.....do	
25630	....do ...	.....do	.....do	.....do	
25631	....do ...	.....do	.....do	.....do	
25726	....do ...	Añasco, Porto Rico.....	Jan. 20, 1899	U. S. F. C. Fish-hawk.	
25727	....do ...	Arroyo, Porto Rico.....	.....do	.....do	
25728	Young..	.....do	Feb. 4,1899	.....do	"Under logs on land 20 feet above water."
25729	....do ...	.....do	.....do	.....do	
25730	....do ...	.....do	.....do	.....do	
25731	....do ...	.....do	.....do	.....do	
25732	....do ...	Rio de Caguito, Caguas, Porto Rico.	Jan, 9, 1899	.....do	
25733	....do ...	.....do	.....do	.....do	
25734	....do ...	.....do	.....do	.....do	
25735	....do ...	.....do	.....do	.....do	
25736	....do ...	.....do	.....do	.....do	
25737	....do ...	.....do	.....do	.....do	
25738	....do ...	.....do	.....do	.....do	
25739	....do ...	.....do	.....do	.....do	
25740	Adult ..	Caguas, Porto Rico.....	Jan. 8, 1899	.....do	
25741	Tadpole	.....do	Jan. 9, 1899	.....do	
25742	....do ...	.....do	.....do	.....do	
25759	Young..	Aibonito, Porto Rico	Feb. 3, 1899	.....do	
25772	Half gr .	Bayamon, Porto Rico	Jan. 5,1899	.....do	
25773	Young..	.....do	.....do	.....do	
25774	....do ...	.....do	.....do	.....do	
25775	....do ...	.....do	.....do	.....do	
26091	Adult ..	Hucares, Porto Rico.....	Feb. 15,1899	.....do	
26092	Tadpole	.....do	.....do	.....do	
26817	Adult ..	Pueblo Viejo, Porto Rico.....	Feb. 14,1900	L. Stejneger.....	
26818	Young..	.....do	.....do	.....do	
26819	Half gr .	.....do	.....do	.....do	
26820	Adult ..	Mameyes, Porto Rico.....	Mar. 3,1900	.....do	Description, p. 576.
26821	....do ...	.....do	.....do	.....do	Do.
26822	....do ...	.....do	Feb. 20,1900	.....do	
26823	....do ...	.....do	.....do	.....do	

List of specimens of Leptodactylus albilabris—Continued.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
26824	Half gr.	Mameyes, Porto Rico	Feb. 20, 1900	L. Stejneger	
26825	do	do	do	do	
26826	do	do	do	do	
26827	do	do	do	do	
26828	do	do	do	do	
26829	do	do	do	do	
26830	do	do	do	do	
26831	Young	do	do	do	
26832	do	do	do	do	
26833	do	do	do	do	
26834	do	do	do	do	
26835	Tadpole	do	do	do	
26894	Young	Catalina plantation, Porto Rico.	Mar. 1, 1900	do	Description, p. 576.
26895	Tadpole	do	do	do	Description, p. 577.
26981	Adult	Mameyes, Porto Rico	Mar. 5, 1900	do	
26982	do	do	do	do	
27053	do	Luquillo, Porto Rico	Mar. 7, 1900	C. W. Richmond	
27084	Adult	Vieques Island	Mar. 24, 1900	L. Stejneger	Description and figure, pp. 576–577.
27085	do	do	do	do	
27086	do	do	do	do	
27087	do	do	do	do	
27088	do	do	do	do	
27089	do	do	do	do	
27090	do	do	do	do	
27091	do	do	do	do	
27092	do	do	do	do	
27093	do	do	do	do	
27094	do	do	do	do	
27095	do	do	do	do	
27096	do	do	do	do	
27097	do	do	do	do	
27098	do	do	do	do	
27099	do	do	do	do	
27100	do	do	do	do	
27101	do	do	do	do	
27102	Adult	do	do	do	
27103	do	do	do	do	
27104	do	do	do	do	
27105	Half gr.	do	do	do	
27106	do	do	do	do	
27107	do	do	do	do	
27108	do	do	do	do	
27109	do	do	do	do	
27110	do	do	do	do	
27111	do	do	do	do	
27112	do	do	do	do	
27113	do	do	do	do	
27114	do	do	do	do	
27115	do	do	do	do	
27116	do	do	do	do	
27117	do	do	do	do	
27118	do	do	do	do	
27119	do	do	do	do	

List of specimens of Leptodactylus albilabris—Continued.

U. S. N. M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
27120	Half gr.	Vieques Island	Mar. 24, 1900	L. Stejneger	
27121	do	do	do	do	
27122	Young	do	do	do	
27123	do	do	do	do	
27124	do	do	do	do	
27125	do	do	do	do	
27126	do	do	do	do	
27127	do	do	do	do	
27128	do	do	do	do	
27129	do	do	do	do	
27130	do	do	do	do	
27131	do	do	do	do	
27132	do	do	do	do	
27133	do	do	do	do	
27134	do	do	do	do	
27135	do	do	do	do	Tail unabsorbed.
27136	do	do	Mar. 27, 1900	do	
27137	Adult	do	do	do	
27138	do	do	Mar. 22, 1900	do	
27139	Young	do	do	do	
27227	do	Utuado, Porto Rico	Apr. 7, 1900	do	
27228	do	do	do	do	
27229	do	do	do	do	
27230	do	do	do	do	
27231	Half gr.	do	Apr. 8, 1900	do	
27232	do	do	do	do	
27233	do	do	do	do	
27234	Tadpoles	do	Apr. 9, 1900	do	
27235	Young	do	Apr. 11, 1900	C. W. Richmond	
27236	do	do	do	do	
27313	Adult	Ponce, Porto Rico	Apr. 16, 1900	L. Stejneger	Near military road, 3 miles east of Ponce.
27749	do	Mayaguez, Porto Rico	Sept., 1900	B. S. Bowdish	
27750	do	do	do	do	
27751	Half gr.	do	do	do	
27752	do	do	do	do	
27753	Young	do	do	do	
27754	do	do	do	do	
27755	do	do	do	do	
27756	do	do	do	do	
27757	do	do	do	do	
27758	do	do	do	do	
27775	Half gr.	Humacao, Porto Rico	Spring, 1900	L. M. McCormick	
29357	Adult	Mayaguez, Porto Rico	July 19, 1901	B. S. Bowdish	In burrow in sand bank about 12 inches.
29358	Half gr.	do	do	do	Edge of sand bank under sod.
29359	Adult	do	do	do	In burrow in sand bank about 8 inches deep.
29360	do	do	do	do	Under sod, edge of sand bank.

List of specimens of Leptodactylus albilabris—Continued.

U. S. N. M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
29361	Adult ..	Mayaguez, Porto Rico.....	July 19, 1901	B. S. Bowdish	About 14 inches into sand bank in burrow.
29362	Half gr .	.....do	.....do	.....do	In burrow under sod, edge of sand bank.
29390	Adult ..	.....do	July 30, 1901	.....do	Under root-clump of grass on sandy bank.
29391	Half gr .	.....do	.....do	.....do	Under roots of bush in sandy field.

Genus ELEUTHERODACTYLUS[a] Duméril and Bibron.

1841. *Eleutherodactylus* Duméril and Bibron, Erpét. Gén., VIII, p. 620 (type *E. martinicensis*).
1843. *Hylodes* Fitzinger, Syst. Rept., p. 31 (type *H. martinicensis*) (not of 1826).
1843. *Euhyas* Fitzinger, Syst. Rept., p. 31 (type *H. ricordii*).
1843. *Lithodytes* Fitzinger, Syst. Rept., p. 31 (type *H. lineatus*).

This genus is usually, but wrongly, known as *Hylodes*. A genus of this name was instituted by Fitzinger in 1826,[b] based upon two species only, one of which must be the type. They were *Hyla gravenhorstii* Fitzinger and *Hyla ranoides* Spix. The former is a nomen nudum and was never described, the generic term *Hylodes* being thus restricted to *H. ranoides*. Regarding the word *Hylodes* as improperly formed, Wagler, in 1830, substituted[c] *Enydrobius*, which consequently is a synonym pure and simple. Tschudi, in 1838,[d] expressly recognizes *H. ranoides* as the type of *Hylodes*,[e] but at the same time he erected *Elosia* for Lichtenstein's *Hyla nasus* (or *nasulus*, as Tschudi writes), not knowing that this species was identical with *H. ranoides*, the type of *Hylodes*. This error has been perpetuated by later writers, chiefly led by Duméril and Bibron, and also possibly influenced by the fact that Fitzinger himself, in 1843, followed the example of these authors and substituted *H. martinicensis*, which was not described until 1838, as type for the genus established by himself in 1826.

As to the proper name for the genus the choice lies between the one

[a] ἐλεύθερος, free; δάκτυλος, digit.
[b] Neue Class. Rept., p. 38.
[c] Nat. Syst. Amph., p. 202.
[d] Classification der Batrachier, p. 36.
[e] "Dieses Genus [*Hylodes*], welches zuerst von Fitzinger, A. R. p. 38, aufgestellt und hernach unnöthiger Weise von Wagler, S. A. p. 201, in Enydrobius umgeändert wurde, wird durch die Spix'sche Hyla ranoides repräsentirt." Tschudi, Classification der Batrachier, p. 36.

which Duméril and Bibron published in 1841 as having been given previously by them to *H. martinicensis* in manuscript, and the two names given by Fitzinger in 1843 to *H. ricordii* and *H. lineatus*. The proper interpretation seems to be to regard *Eleutherodactylus* as a substitute name, especially when compared with Duméril and Bibron's note concerning *Lepthyla* on a previous page,[a] and it is here adopted accordingly.

Eleutherodactylus is a genus characteristic of tropical America, and comprises a large number of species often difficult to distinguish. In many respects they resemble the true tree toads, though structurally they are nearer the frog-like *Leptodactylus*.

Numerous species occur in the Antillean islands, five being found in Porto Rico and dependent islands.

KEY TO THE SPECIES OF ELEUTHERODACTYLUS IN PORTO RICO.

a^1 Belly granular; vomerine teeth in two short straight series not extending laterally beyond the choanæ (fig. 17).

b^1 Nostrils much nearer tip of snout than eye (fig. 15).

c^1 Hind leg averages about one-half more than total length of head and body. *E. auriculatus*, p. 583.

c^2 Hind leg averages about one-third more than total length of head and body. *E. antillensis*, p. 591.

b^2 Nostrils halfway between tip of snout and eye (fig. 35) ..... *E. unicolor*, p. 597.

a^2 Belly smooth; vomerine teeth in two long angular series extending laterally beyond the choanæ (fig. 27).

b^1 Distance of vomerine teeth from choanæ less than diameter of choanæ (fig. 32); soles of feet tubercular; hind foot nearly as long as fore leg; color of back and sides pale, spotted with blackish ..... *E. monensis*, p. 595.

b^2 Distance of vomerine teeth from choanæ nearly twice the diameter of the choanæ (fig. 27); soles of feet perfectly smooth; hind foot longer than fore leg; color above uniform brown with a pale longitudinal band on each side of back, sides blackish ..... *E. richmondi*, p. 593.

ELEUTHERODACTYLUS AURICULATUS[b] (Cope).

1862. *Hylodes auriculatus* Cope, Proc. Phila. Acad., 1862, p. 152 (type locality, Eastern Cuba; type No. 5207 U.S.N.M.).—Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 214 (Santo Domingo).

1876. *Hylodes martinicensis* Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 709, pl. 1 (Porto Rico) (not of Tschudi).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 315 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 71, 161 (Porto Rico).—Garman, Bull. Essex Inst., XIX, 1887, p. 13 (part: Bayamon, Porto Rico).—Boettger, Kat. Batr. Mus. Senckenberg., 1892, p. 29 (Porto Rico).

The identity of the tree toad of Porto Rico has been a matter of great uncertainty. Peters, who compared Porto Rican specimens with the type of *Hylodes martinicensis* from Martinique, declares them to be identical; and Garman, who also had before him specimens from both localities, came to the same result.

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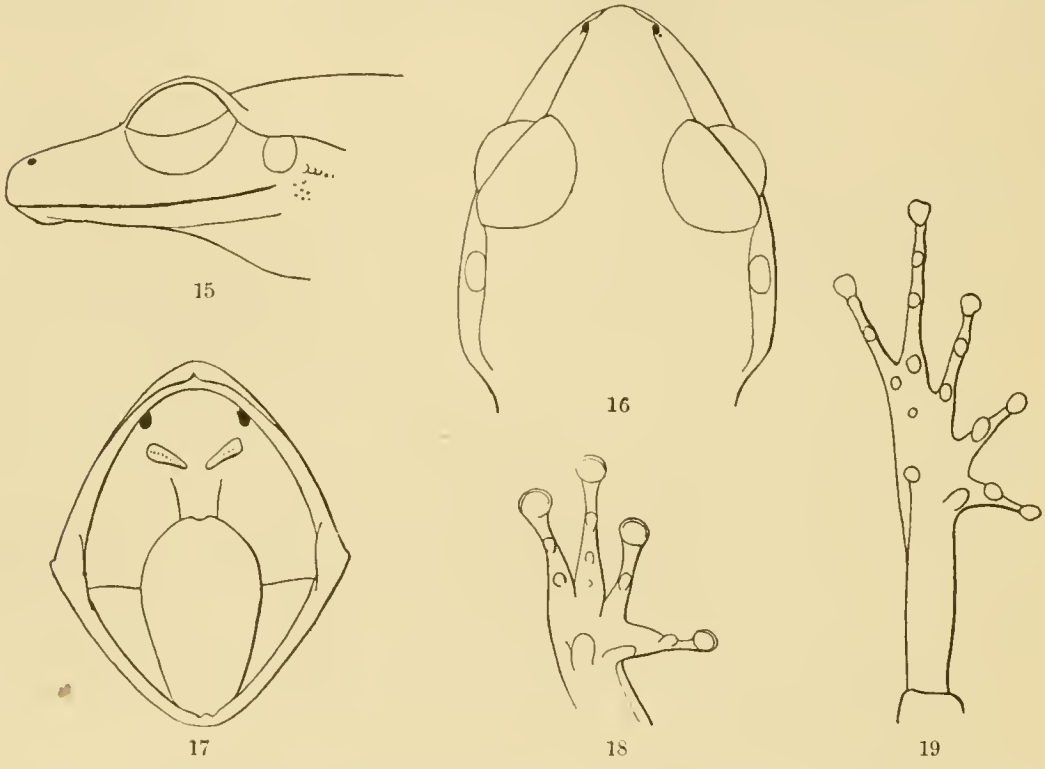
[a] Erpét. Gén., VIII, p. 504.

[b] *Auriculatus*=with small ears.

I have no specimens from Martinique itself, but with a large series from Guadeloupe (whence it is said the species was introduced to Martinique), which, therefore, I take to represent *E. martinicensis* fairly well, and another large series from St. Kitts agreeing with the Guadeloupe series, I must dissent from the above conclusion. The Porto Rican specimens are certainly very close to the latter species, and the proportions of the hind legs to the length of the head and body are nearly the same; nevertheless, the Porto Rican specimens have constantly a shorter second toe and the exposed tympanum averages larger. In the Porto Rican specimens the end of the first toe when pressed alongside the second nearly reaches the disk of the



FIGS. 15–19.—ELEUTHERODACTYLUS AURICULATUS. 2 × natural size. 15, side of head; 16, top of head; 17, inside of mouth; 18, underside of fore foot; 19, underside of hind foot. No. 26912, U.S.N.M.

latter, while in the Guadeloupe, St. Kitts, and Tobago specimens the interval between the two disks is considerably larger than the diameter of the disks.

In both respects the Porto Rican specimens agree well with typical Cuban specimens of *E. auriculatus* (Cope), from which I can not separate them. Boulenger refers three Santo Domingo specimens in the British Museum to the same species, and describes them as having the first toe "as long as second," a character he also uses in the "key" as the distinction of *H. auriculatus*, and I take it that by this phrase he intends to express the same relation between the toes as I have described above. A poorly preserved specimen in the U. S. National Museum (No. 9858) from Santo Domingo I am also unable to separate from *E. auriculatus*.

I can not agree with Boulenger, however, in placing Reinhardt and

Luetken's *H. antillensis* from St. Thomas as a synonym of *E. auriculatus*. The former has entirely different proportions, the legs and feet being much shorter.

Description of adult.—U.S.N.M. No. 26912, Camp El Yunque, Porto Rico, 2,978 feet altitude; February 24, 1900; L. Stejneger, collector. Tongue narrow, oval, nicked behind; vomerine teeth in two short oblique series some distance behind the choanæ, not extending laterally beyond the latter and strongly converging backward, the interval between them about equaling their distance from the choanæ; nostrils much nearer the tip of the snout than the eyes, their distance from the eye nearly equalling the diameter of the latter; upper eyelids nearly as wide as interorbital space; tympanum small, about one-third the diameter of the eye, its distance from the eye equaling the diameter; fingers with well-developed disks, first equaling second; disks of toes smaller than those of the fingers; tip of first toe reaching the base of the disk of the second; two moderate metatarsal tubercles; soles smooth except for one or two obscure tubercles; no tarsal fold; the bent limbs being pressed along the side, knee and elbow overlap; hind limb being extended along the side, heel reaches eye; hind limbs being placed vertically to the axis of the body, the heels overlap considerably; skin above with scattered granules on back and sides, the eyelids more densely granulated; a very fine, scarcely perceptible, glandular ridge down the middle of the upper surface from tip of snout to vent; belly and posterior half of thighs strongly granular; throat and anterior half of thighs smooth; the belly has no specially differentiated adhesive area or disk.

Dimensions.

	mm.
Tip of snout to vent	39
Width of head	16
Diameter of eye	5.5
Diameter of tympanum	1.8
Foreleg from axilla	23
Hind leg from vent	58
Vent to heel	33

The largest specimens out of 115 collected in Porto Rico (Nos. 26908–10) measure 43 mm. from tip of snout to vent.

Coloration of living specimens.—The variation of color presented by this species is simply endless, there being scarcely ever two specimens alike, and a detailed description of individuals is therefore useless. The description of the first adult specimen collected may serve as an example, however, to which I may then append the notes written down with large series of living specimens before me.

U.S.N.M. No. 26887; L. Stejneger No. 9024; Catalina plantation, Porto Rico, about 850 feet altitude; February 21, 1900.—Above dusky fawn color with a very narrow vertebral line, a narrow canthal

line and a broad lateral line in continuation of the latter, pale buffy pink, all the light lines and bands more or less edged with dusky; triangle on top of head forward of a line through the center of the eyes distinctly paler, a dusky cross-line at middle of eyes defining the triangular space behind; below pale, greenish on belly; underside of femur dull ferruginous; iris golden, shaded with reddish and brownish and reticulated with blackish.

At our camp about 500 feet below the top of El Yunque Mountain (3,485 feet) I gathered, between February 24 and February 27, over 50 specimens, adult and young, upon which I based my observations on the truly extraordinary variability of this species, both as to ground color and pattern.

While the adult specimens seem to show a more uniform pattern with certain nearly constant features, namely, a pale triangular snout to the middle of the upper eyelids, followed by a dusky cross-band and a blackish narrow streak along the canthus rostralis through the eye (the horizontal pupil forming part of this line) over the ear to the shoulder, the individual range in their ground color is very great, from pale olive gray through clay color and pale cinnamon rufous to dark sepia. Their power of changing their general color is also great, for one which when caught on the ground under an old palm leaf was nearly blackish brown, changed within a quarter of an hour to pale clay color. The most abnormal among the large specimens is rather dark grayish brown (slightly paler after being caught) and covered with numerous cream-colored irregular blotches, which on the legs assume the character of more or less regular cross-bands. But the young specimens show a much wider and more perplexing range of variation, for while the pattern indicated above for the adults can be traced in perhaps most of these youngsters, in others it is absolutely obliterated. Yet in all this bewildering variability there may be traced several different styles which, however, are connected by all sort of intermediate individuals.

The most striking of these patterns consists in a cinnamon-colored stripe down the middle of the back edged with dusky and widening on the sacrum and toward the head, where it is abruptly cut off by the interorbital dusky cross-band; this triangular expansion thus formed incloses on the occiput a small spot which, like the sides, is bright light yellowish green; the pale triangle on the snout and cross-bands on the hind limbs are similarly colored, but much duller. This style is not rare, though apparently confined to the smallest specimens. I found four essentially alike at the base of the leaves of the same air-plant, probably belonging to the same brood.

The most common pattern (found in perhaps 75 per cent of the young specimens) consists in a pair of elongated pale dorsal marks slightly curved, with the convexity toward the median line, as well as

a similarly colored spot on the occiput and cross-bars on the hind legs, all the pale marks more or less plainly edged with dusky; the ground color varies from dark to light grayish brown overlaid to a varying degree with yellowish or reddish. This style is evidently only a modification of the one described above, the dark ground color having encroached upon the light flanks. Some of these specimens are so dark that the pattern can be made out only with difficulty. One of the large adult specimens shows distinct traces of the dorso-lateral pale semilunar marks.

The next style, represented by a few specimens only, is very different. These are nearly uniform dark brownish gray with a very narrow, sharply defined pale line from tip of snout down the middle of the back to the vent, where it bifurcates and extends along the posterior edge of each femur; another line, less pale, crosses this one on the interorbital space. Several specimens combine the common pattern as described above with this narrow median line.

A single young specimen in the lot is light olive gray with a pale longitudinal band on the middle line from snout to vent so broad as to nearly fill the interorbital space; the post-femoral streak is faintly indicated; the pale lines are indistinctly outlined with dusky and there are similar cross marks visible on the hind legs.

A curious feature is also the variability in the coloration of the iris. In the younger specimens it is brassy, more or less overlaid with dusky. In the adults, however, it is golden with a vertical blackish streak in the middle of the lower half. However, if the sides of the face are much darker than the region above, the iris is also darker in the lower half below the narrow horizontal pupil which, as indicated above, forms the continuation of the canthal black line.

That the coqui or tree toad in other localities assumes a coloration closely agreeing with the surroundings is proven by several specimens collected in the western part of the island. A large adult specimen caught by Dr. Richmond near the summit of the pass between Adjuntas and Ponce, was of a reddish brown ground color, closely resembling the clay upon which it was found (U.S.N.M. No. 27280; L. S. No. 9067). The four specimens, on the other hand, which we took under stones in the white clay hills east of Ponce on April 16, were nearly uniform pale clay colored, with no markings, not even a trace of a pale dorso-lateral band.

Habitat.—The "coqui" is common all over Porto Rico, from sea level to the top of the highest mountains; in fact we found it most abundant in the excessively damp woods near the top of El Yunque. It does not occur on Vieques, nor has it been found on Mona Island, a distribution quite unexpected in view of the fact that the species also occurs in Santo Domingo and eastern Cuba.

Habits.—Although by no means confined to living on or among the

trees this species probably deserves the name of tree toad more than any of the other species of the genus inhabiting these islands. A favorite place of concealment during the day we found to be the axils of the leaves of palms and liliaceous plants, but it was also caught under the bark of trees, fallen logs, stones, or in crevices in the rocks, clay banks, or in holes in trees.

They keep usually quiet during the day, but toward dusk they come out from their hiding places and the island then begins to resound with their call notes. These I believe to be different in the adults and the young. The former utter a loud and rather sonorous ō-ki′-ki′-ki′ or simply a persistently repeated ō-ki′, ō-ki′ . . . The chorus of soft "pit, pit, pit" around our camp in the evening I attributed to the young ones.

Living specimens placed in a glass jar adhere to the sides chiefly by their digital pads or disks. The belly is flattened against the glass, but there is apparently no special adhesive area.

The reproduction of this species is most extraordinary in that the young escape from the egg a full developed frog without undergoing any tadpole stage or metamorphosis. The eggs are usually deposited in the damp axils of an air plant, about 20 to 30 in a lump. The development of the young in the egg is remarkable for the fact that the anterior and posterior limbs appear simultaneously and that there is no trace of gills. In about three weeks the young escape from the egg, the only sign of immaturity being a short rudiment of tail which is absorbed, however, in a few hours. The discovery of this extraordinary batrachian development, which so strongly foreshadows that of the amniote vertebrates, was made by Dr. Bello y Espinosa in 1870 and has been confirmed and elaborated by Gundlach and Peters.

List of species of Eleutherodactylus auriculatus.

U. S. N. M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
25545	Adult ..	Lares, Porto Rico.....	Jan. 26, 1899	A. B. Baker	
25606	....do ...	Adjuntas, Porto Rico	Jan. 29, 1899	.....do	
25620	....do ...	Aguas Buenas, Porto Rico....	Jan. 12, 1899	.....do	
25621	....do ...	.....do	.....do	.....do	
25622	....do ...	.....do	.....do	.....do	
25623	....do ...	.....do	.....do	.....do	
25624	Half gr .	.....do	.....do	.....do	
25625	Adult ..	.....do	.....do	.....do	
25626	....do ...	.....do	.....do	.....do	
25627	Half gr .	.....do	.....do	.....do	
25632	Adult ..	Lares, Porto Rico.....	Jan. 26, 1899	.....do	
25633	....do ...	.....do	.....do	.....do	
25725	....do ...	El Yunque, Porto Rico..	Feb. 19, 1899	U. S. Fish Commission.	
25743	....do ...	Caguas, Porto Rico.....	Jan. 9, 1899	.....do	
25744	....do ...	.....do	.....do	.....do	
25745	....do ...	.....do	.....do	.....do	
25746	....do ...	.....do	.....do	.....do	

List of species of Eleutherodactylus auriculatus—Continued.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
25747	Adult ..	Caguas, Porto Rico	Jan. 9, 1899	U. S. Fish Commission.	
25748	....do ...	.....do	.....do	.....do	
25749	Half gr .	Aibonito, Porto Rico	Feb. 3, 1899	.....do	
25750	....do ...	.....do	.....do	.....do	
25751	....do ...	.....do	.....do	.....do	
25752	....do ...	.....do	.....do	.....do	
25753	....do ...	.....do	.....do	.....do	
25754	Young..	.....do	.....do	.....do	
25755	....do ...	.....do	.....do	.....do	
25756	....do ...	.....do	.....do	.....do	
25757	....do ...	.....do	.....do	.....do	
25758	....do ...	.....do	.....do	.....do	
25776	....do ...	Mayaguez, Porto Rico	Jan. 20, 1899	.....do	
26836	Adult ..	Mameyes, Porto Rico.....	Feb. 20, 1900	L. Stejneger	
26837	Half gr .	.....do	.....do	.....do	
26838	....do ...	.....do	.....do	.....do	
26839	Young..	.....do	.....do	.....do	
26840	....do ...	.....do	.....do	.....do	
26885	Adult ..	Catalina plantation, Porto Rico.	Mar. 1, 1900	.....do	
26886	....do ...	.....do	.....do	.....do	
26887	....do ...	.....do	Feb. 21, 1900	.....do	Description, p. 585.
26888	Young..	.....do	.....do	.....do	
26889	....do ...	.....do	.....do	.....do	
26890	....do ...	.....do	.....do	.....do	
26891	....do ...	.....do	.....do	.....do	
26892	....do ...	.....do	Mar. 1, 1900	.....do	
26893	....do ...	.....do	.....do	.....do	
26908	Adult ..	Camp El Yunque, Porto Rico.	Feb. 27, 1900	.....do	2,978 feet altitude.
26909	....do ...	.....do	Feb. 24–25, 1900.	.....do	
26910	....do ...	.....do	Feb. 25, 1900	.....do	
26911	....do ...	.....do	.....do	.....do	
26912	....do ...	.....do	.....do	.....do	Description, p. 585; fig., p. 584.
26913	....do ...	.....do	.....do	.....do	
26914	Young..	.....do	.....do	.....do	
26915	....do ...	.....do	.....do	.....do	
26916	....do ...	.....do	.....do	.....do	
26917	....do ...	.....do	.....do	.....do	
26918	....do ...	.....do	.....do	.....do	
26919	....do ...	.....do	.....do	.....do	
26920	....do ...	.....do	.....do	.....do	
26921	....do ...	.....do	.....do	.....do	
26922	....do ...	.....do	.....do	.....do	
26923	....do ...	.....do	.....do	.....do	
26924	....do ...	.....do	.....do	.....do	
26925	....do ...	.....do	.....do	.....do	
26926	....do ...	.....do	.....do	.....do	
26927	....do ...	.....do	.....do	.....do	
26928	....do ...	.....do	.....do	.....do	
26929	....do ...	.....do	.....do	.....do	
26930	....do ...	.....do	.....do	.....do	
26931	....do ...	.....do	.....do	.....do	
26932	....do ...	.....do	.....do	.....do	
26933	....do ...	.....do	.....do	.....do	

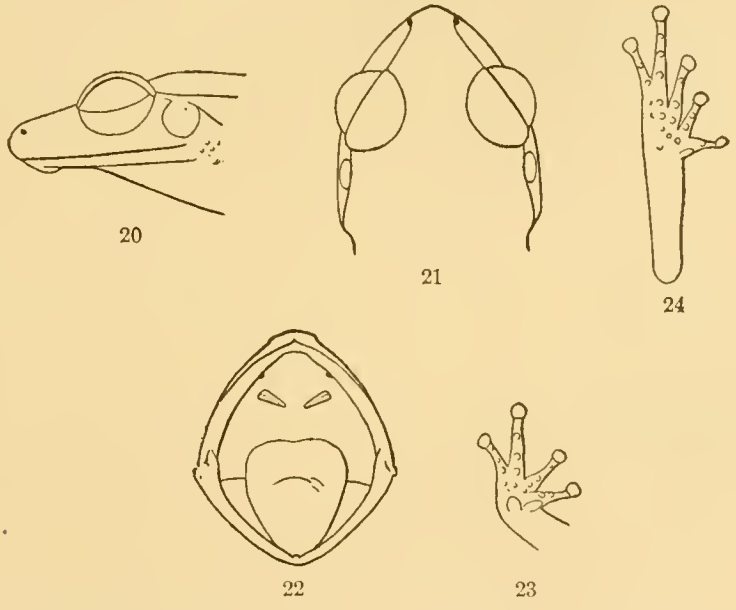
List of species of Eleutherodactylus auriculatus—Continued.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
26934	Young..	Camp El Yunque, Porto Rico.	Feb. 25, 1900	L. Stejneger.....	
26935	....do...	.....do.....	.....do.....	.....do.....	
26936	....do...	.....do.....	.....do.....	.....do.....	
26937	....do...	.....do.....	.....do.....	.....do.....	
26938	....do...	.....do.....	.....do.....	.....do.....	
26939	....do...	.....do.....	Feb. 27, 1900	.....do.....	
26940	....do...	.....do.....	.....do.....	.....do.....	
26941	....do...	.....do.....	.....do.....	.....do.....	
26942	....do...	.....do.....	.....do.....	.....do.....	
26943	....do...	.....do.....	.....do.....	.....do.....	
26944	....do...	.....do.....	.....do.....	.....do.....	
26945	....do...	.....do.....	.....do.....	.....do.....	
26946	....do...	.....do.....	.....do.....	.....do.....	
26947	....do...	.....do.....	.....do.....	.....do.....	
26948	....do...	.....do.....	.....do.....	.....do.....	
26949	....do...	.....do.....	.....do.....	.....do.....	
26950	....do...	.....do.....	.....do.....	.....do.....	
26951	....do...	.....do.....	.....do.....	.....do.....	
26952	....do...	.....do.....	.....do.....	.....do.....	
26953	....do...	.....do.....	.....do.....	.....do.....	
26954	Half gr.	.....do.....	.....do.....	.....do.....	
26955	....do...	.....do.....	Feb. 24, 1900	.....do.....	
26964	Adult ..	Mameyes, Porto Rico.....	Mar. 5, 1900	.....do.....	
26965	....do...	.....do.....	.....do.....	.....do.....	
26966	....do...	.....do.....	.....do.....	.....do.....	
26967	....do...	.....do.....	.....do.....	.....do.....	
26968	....do...	.....do.....	.....do.....	.....do.....	
26969	....do...	.....do.....	.....do.....	.....do.....	
26970	....do...	.....do.....	.....do.....	.....do.....	
26971	....do...	.....do.....	.....do.....	.....do.....	
26972	....do...	.....do.....	.....do.....	.....do.....	
26973	....do...	.....do.....	.....do.....	.....do.....	
26974	....do...	.....do.....	.....do.....	.....do.....	
26975	....do...	.....do.....	.....do.....	.....do.....	
26976	....do...	.....do.....	.....do.....	.....do.....	
26977	....do...	.....do.....	.....do.....	.....do.....	
26978	Half gr.	.....do.....	.....do.....	.....do.....	
26979	Young..	.....do.....	.....do.....	.....do.....	
26980	....do...	.....do.....	.....do.....	.....do.....	
27047	Adult ..	Luquillo, Porto Rico	Mar. 7, 1900	.....do.....	
27048	....do...	.....do.....	.....do.....	.....do.....	
27049	....do...	.....do.....	.....do.....	.....do.....	
27050	....do...	.....do.....	.....do.....	.....do.....	
27051	....do...	.....do.....	.....do.....	.....do.....	
27052	....do...	.....do.....	.....do.....	.....do.....	
27147	....do...	Arecibo, Porto Rico	Apr. 3, 1900	.....do.....	
27224	Half gr.	Utuado, Porto Rico.....	Apr. 9, 1900	C. W. Richmond..	
27225	....do...	.....do.....	.....do.....	.....do.....	
27226	Adult ..	.....do.....	.....do.....	L. Stejneger.....	
27280	....do...	Pass between Adjuntas and Ponce, Porto Rico.	Apr. 15, 1900	C. W. Richmond..	Description, p. 587.
27314	....do...	Ponce, Porto Rico.....	Apr. 16, 1900	L. Stejneger.....	
27315	Young..	.....do.....	.....do.....	.....do.....	
27316	....do...	.....do.....	.....do.....	C. W. Richmond..	
27317	....do...	.....do.....	.....do.....	.....do.....	
27774	Adult ..	Humacao, Porto Rico	Spring, 1900..	L. M. McCormick.	

ELEUTHERODACTYLUS ANTILLENSIS[a] (Reinhardt and Luetken.)

1863. *Hylodes antillensis* Reinhardt and Luetken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862, p. 209; author's separate, p. 57 (type locality, St. Thomas; type in Mus. Copenh.).

This species has been placed as a synonym of *E. auriculatus* by Boulenger, but the two are very different indeed. If individuals of the same size are placed side by side the difference in the size of the legs and feet are particularly striking, they being much shorter in *E. antillensis*. The fore limbs are especially minute, so much so that the length from axilla to tip of longest finger is about one-half the length from tip of snout to vent, while in *E. auriculatus* the corresponding length of arm and hand greatly exceeds, often by 33 per cent, half the total length of head and body. As a rule, the heel and elbow of the adpressed limbs barely touch in *E. antillensis*, while in *E.*



Figs. 20–24.—Eleutherodactylus antillensis. 2 × natural size. 20, side of head; 21, top of head; 22, inside of mouth; 23, underside of fore foot; 24, underside of hind foot. No. 27075, U.S.N.M.

auriculatus they overlap considerably. In the latter the heels also overlap when the bent hind limbs are placed vertically to the axis of the body—while in this position the heels of *E. antillensis* just meet. Notwithstanding the enormous variation in the coloration of *E. auriculatus*, there seems to be some difference in the average color of both species. The larger *E. antillensis* obtained in Vieques are nearly uniformly pale above, and are therefore closely approximated by the pale specimens of *E. auriculatus* which we collected in the white limestone hills near Ponce (Nos. 27314–17), but all the young ones were "dull grayish brown with regular dusky longitudinal markings," thus presenting none of the peculiar patterns so characteristic of the young *E. auriculatus* and described above under the latter species.

Description.—U.S.N.M. No. 27075, Isabella Segunda, Vieques

[a] *Antillensis:* of, or belonging to, the Antilles.

Island, Porto Rico; March 24, 1900; L. Stejneger, collector. Tongue rather broad, heart-shaped, slightly nicked behind; vomerine teeth in two club-shaped oblique series, some distance behind but not laterally beyond the choanæ, converging backward and well separated; nostril much nearer the tip of snout than the eyes, their distance from the eye less than the diameter of the latter; upper eyelids narrower than the interorbital space; tympanum a little less than one-half the diameter of the eye, its distance from the eye less than one-half its diameter; fingers with rather small disks, first equalling second; disks of toes not smaller than those of the fingers; tip of first toe reaching disk of second; two metatarsal tubercles, the outer being rather small and obscure; series of plantar tubercles corresponding to metatarsals; no tarsal fold; the bent limbs being pressed along the side, knee and elbow, fail to meet; hind limb being extended along the side, heel reaches the eye: hind limbs being placed vertically to the axis of the body, the heels barely meet; skin above with scattered granules and a very narrow raised median line from tip of snout to vent; throat and chest smooth, belly and posterior aspect of femur strongly granular; a strong fold across the breast between the axillæ.

Dimensions.

	mm.
Tip of snout to vent	25
Width of head	10
Diameter of eye	4
Diameter of tympanum	1.75
Fore leg from axilla	13
Hind leg from vent	32.5
Vent to heel	19

This is the largest of eleven specimens collected by us in Vieques. The largest specimen from St. Thomas described by Reinhardt and Luetken measured 31 mm. in total length. This species seems therefore to be somewhat smaller than *E. auriculatus*.

Coloration of living specimens.—The larger specimens collected by us in Vieques were pale gray with scarcely any dusky marking except a dark streak from nostrils, through eye, over and behind the tympanum, a few dark mottlings on the posterior concealed part of the thigh, and a dusky longitudinal line on inner side of tibia and tarsus. The smaller specimens were of a uniform dull grayish brown above with regular longitudinal dusky markings.

Habitat.—This species seems to be confined to Vieques and St. Thomas and is apparently not common. Its occurrence on St. John and St. Croix is somewhat doubtful, according to Reinhardt and Luetken. It was not found by the U. S. Fish Commission parties in Vieques during their visit in 1899, but a young specimen from this island is in the Zoological Museum in Copenhagen.

The only place we found it in Vieques was in the nearly dry bed of a small creek back of the town of Isabella Segunda, where they kept themselves concealed on the damp ground under flat stones.

List of specimens of Eleuthrodactylus antillensis.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
27075	Half gr.	Vieques Island	Mar. 24, 1900	L. Stejneger	Description and figure, p. 591.
27076	....do	....do	....do	....do	
27077	Young	....do	....do	....do	
27078	....do	....do	Mar. 22, 1900	....do	
27079	....do	....do	....do	....do	
27080	....do	....do	....do	....do	
27081	....do	....do	....do	....do	
27082	....do	....do	....do	....do	
27083	....do	....do	....do	....do	
27140	....do	....do	Mar. 24, 1900	C. W. Richmond	
27141	....do	....do	....do	....do	

ELEUTHERODACTYLUS RICHMONDI[a] new species.

Diagnosis.—Toes free without a vestige of web; belly smooth; tympanum distinct, less than one-half the diameter of the eye; vomerine teeth in two long angular transverse series, extending beyond the external border of the inner nares and some distance behind them; head moderately broad; interorbital space somewhat broader than upper eyelid; upper surface granular; second finger longer than first; inner metatarsal tubercle large; no plantar tubercles; digital disks small; nostril much nearer tip of snout than eye; hind limbs not cross-barred.

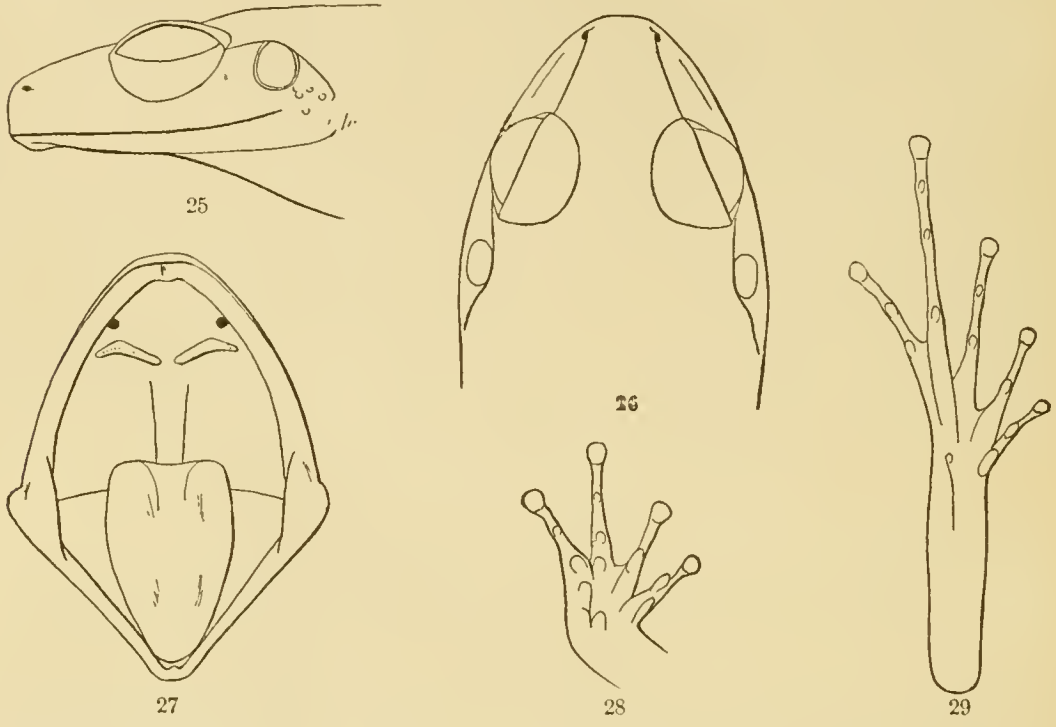
Habitat.—Porto Rico.

Type.—U.S.N.M. No. 26884; Catalina plantation, about 890 feet altitude; L. Stejneger, collector; February 22, 1900.

Description of type specimen.—U.S.N.M. No. 26884; Catalina plantation, Porto Rico, 890 feet altitude; February 22, 1900; L. Stejneger, collector. Tongue narrow, somewhat emarginate behind; vomerine teeth in two angular series behind the choanæ, their distance from the choanæ greater than the diameter of the latter; inner arm of each vomerine series longer, outer extending laterally beyond the choanæ; nostril much nearer the tip of the snout than the eye, the distance from the eye slightly less than the diameter of the latter; upper eyelids somewhat narrower than interorbital space; tympanum slightly less than one-half the diameter of the eye, its distance from the latter slightly less than its diameter; disks of fingers rather small, first finger

[a] To Dr. Charles W. Richmond.

shorter than second; disks of toes small, first toe short, only reaching subarticular tubercle of second; subarticular tubercles well developed; two well developed metatarsal tubercles; no plantar tubercles; no tarsal fold; the bent limbs being pressed along the sides, knee and elbow overlap; hind limb being extended along the side, heel reaches center of eye; hind limbs being placed vertically to the axis of the body, the heels overlap; skin above and on flanks granular, underside smooth; posterior aspect of femur areolate.



FIGS. 25–29.—ELEUTHERODACTYLUS RICHMONDI. 2 × natural size. 25, side of head; 26, top of head; 27, inside of mouth; 28, underside of fore foot; 29, underside of hind foot. No. 26884, U.S.N.M.

Dimensions.

	mm.
Tip of snout to vent	38
Width of head	15
Diameter of eye	5.5
Diameter of tympanum	2.5
Fore leg from axilla	24
Hind leg from vent	62
Vent to heel	35

Colors of living animal.—Adult. U.S.N.M. No. 26884 (L. S. No. 9025), Catalina plantation, 890 feet altitude, February 22, 1900. Back dusky chestnut, lighter on sacrum; from each nostril along canthus rostralis, edge of eyebrow and sides of back a narrow dirty bluish-white stripe somewhat wider on sides of back than on canthus rostralis; sides of face and flanks below this stripe blackish, legs blackish; fore legs marbled with pale drab, hind legs with dull pale chestnut; under side dull greenish gray, with an ill-defined yellow spot in each groin, and marbled with dusky brown on throat and under side of hind legs. Iris blackish, brassy above pupil.

Several specimens (26958–62) taken at an altitude of about 2,978 feet near the top of El Yunque Mountain, February 24–26, were essentially like the above, to the description of which may be added that the brown color on the back becomes more of an Indian-red on sacrum and femur, fading to a clear rufous flesh-color on the heel. The largest specimen in this lot has the throat strongly suffused with gamboge-yellow.

This species seems to be as remarkable for the stability of its coloration as *E. auriculatus* is for the reverse.

Remarks.—The present species, which I take great pleasure in dedicating to Dr. Charles W. Richmond in grateful memory of cheerful companionship in the native haunts of this interesting novelty, is apparently nearest related to *Eleutherodactylus lentus* (Cope), from which it differs in many important points. Thus, the vomerine teeth are placed much farther back from the interior nares, and the second finger is considerably longer than the first instead of equaling it in length; there is no trace of a web between the toes and the outer metatarsal tubercle is much larger. The coloration also is different and remarkably constant.

Habitat.—This new species thus far has only been collected on El Yunque Mountain, from an altitude of about 900 feet to near the top. It was found on damp ground under stones and leaves.

List of specimens of Eleutherodactylus richmondi.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
26884	Adult ..	Catalina plantation, 890 feet, Porto Rico.	Feb. 22, 1900	L. Stejneger	Type. Description and fig., p. 594.
26956	....do ...	Camp El Yunque, Porto Rico.	Feb. 24–26, 1900.	.....do	About 2,978 feet altitude.
26957	....do ...	.....do	.....do	.....do	
26958	....do ...	.....do	.....do	.....do	p. 595.
26959	....do ...	.....do	.....do	.....do	
26960	....do...	.....do	.....do	.....do	
26961	....do ...	.....do	.....do	.....do	
26962	Young..	.....do	.... do	.....do	

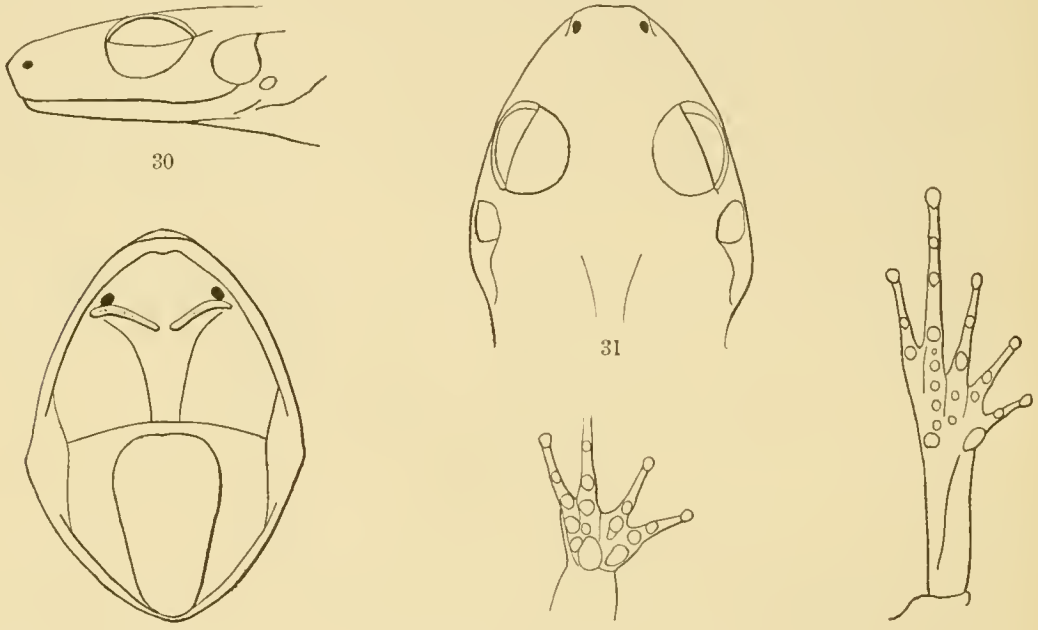
ELEUTHERODACTYLUS MONENSIS[a] (Meerwarth).

1901. *Hylodes monensis* Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, p. 39, pl. I, fig. 11; pl. II, figs. 4–5 (type locality: Mona Island; types No. 761, Mus. Hamburg).

Description of adult.—U.S.N.M. 29389; Mona Island, Porto Rico; August 15, 1901; B. S. Bowdish, collector. Vomerine teeth in two long, slightly angular series, immediately behind and touching the choanæ, extending laterally beyond the outer edge of the latter and

[a] *Monensis*=from Mona Island.

closely approximated medially, the inner rows much longer than the outer; nostrils very close to the tip of the snout, their distance from the eye nearly equaling the diameter of the latter; upper eyelids much narrower than the interorbital space; tympanum one-half the diameter of the eye, its distance from the latter more than one-half its own diameter; disks of fingers very small, first equal to second; disks of toes small, equaling those of the fingers; first toe much shorter than second, its tip scarcely reaching the middle of the penultimate phalanx of the latter; two rather large metatarsal tubercles; well-developed plantar tubercles in series under the metatarsals; a strong tarsal fold nearly the whole length of the tarsus; hind limb being extended forward along the side, the heel reaches center of eye; hind limbs



FIGS. 30-34.—ELEUTHERODACTYLUS MONENSIS. 2 × natural size. 30, side of head; 31, top of head; 32, inside of mouth; 33, underside of fore foot; 34, underside of hind foot. No. 29389, U.S.N.M.

being placed vertically to the axis of the body, the heels meet; skin smooth above and below.

Dimensions.

	mm.
Tip of snout to vent	32
Width of head	14
Diameter of eye	4.5
Diameter of tympanum	2.25
Fore leg from axilla	21
Hind leg from vent	49
Vent to heel	28

Color (in alcohol).—Ground color above pale drab with ill-defined dusky markings; these indicate a subcanthal dark streak; a median narrow line on the snout; a pair of longitudinal narrow lines on interorbital space from the edge of the eyelids converging toward the occiput, but without meeting; an irregular spot on each shoulder and on

the back about five series of smaller spots, which seem to have a tendency to coalesce crosswise; limbs with no indication of cross bands, but irregularly and indistinctly marbled with dusky; underside whitish, unspotted.

Remarks.—I have examined the types of this species in the Hamburg Museum and found them to agree substantially with the above description.

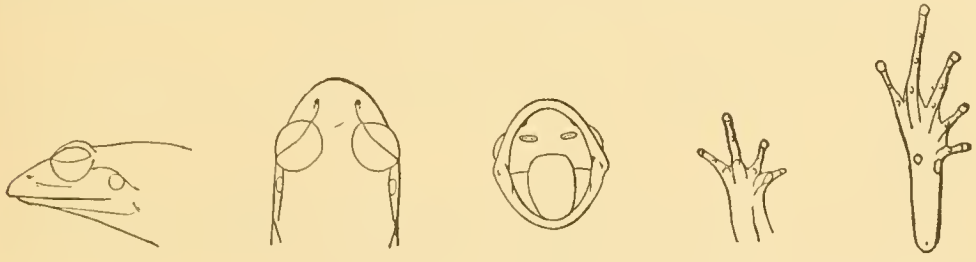
Habitat.—Thus far this species has only been found on Mona Island and is probably confined to it. The types were collected by Mr. Bock in 1892. Mr. Bowdish only obtained one specimen.

List of specimens of Eleutherodactylus monensis.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
29389	Adult ..	Mona Island, Porto Rico	Aug. 15, 1901	B. S. Bowdish.....	Description and figure, pp. 595, 596.

ELEUTHERODACTYLUS UNICOLOR,[a] new species.

Diagnosis.—Toes free without a vestige of web; belly granular; tympanum distinct, one-third the diameter of eye; vomerine teeth in



35 36 37 38 39

FIGS. 35–39.—ELEUTHERODACTYLUS UNICOLOR. 35, side of head; 36, top of head; 37, inside of mouth; 2 × natural size. 38, underside of fore foot; 39, underside of hind foot. 2½ × natural size. No. 26963, U.S.N.M.

two short, straight series, not extending beyond the inner nares; head not broader than body; interorbital space equals upper eyelid; upper surface smooth; second finger longer than first; inner metatarsal tubercle large; digital disks small; nostrils intermediate between eye and tip of snout; hind limbs not cross barred.

Habitat.—Porto Rico.

Type.—Cat. No. 26963, U.S.N.M.; Camp El Yunque Mountain, 2,978 feet altitude; L. Stejneger, collector, February 26, 1900.

Description of type.—U.S.N.M. No. 26963; Camp El Yunque, Porto Rico, 2,978 feet altitude; February 26, 1900; L. Stejneger, collector. Tongue medium, oval, entire behind; vomerine teeth in two short straight series behind the choanæ, but not extending laterally beyond them, widely separated in the middle; snout declining rapidly from the

[a] Of one color.

eyes to the tip; nostrils situated about halfway between eyes and tip of snout, their distance from the eyes one-half the diameter of the eye; upper eyelids as wide as interorbital space; tympanum small, about one-third the diameter of the eye and distant from the latter more than its own diameter; fingers with exceedingly small disks, first slightly shorter than second; disks of toes better developed, first toe much shorter than second; subarticular tubercles well developed; no plantar tubercles; two well-developed metatarsal tubercles; no tarsal fold; hind limbs being bent forward, heels reach the ears, bent vertically to the axis of the body, the heels do not touch; skin above, throat, chest, and anterior aspect of femurs smooth; belly and sides granular.

Dimensions.

	mm.
Tip of snout to vent	16.5
Width of head	6
Diameter of eye	2.5
Diameter of tympanum	0.8
Fore leg from axilla	7
Hind leg from vent	22
Vent to heel	12

Color of living specimen.—Uniformly dusky chestnut above and below, with scattered, scarcely visible pale dots; a short postocular dusky band descending behind the tympanum.

Habitat.—Only a single specimen was captured. It was caught on the ground at our camp on El Yunque Mountain, about 2,978 feet above the sea.

Remarks.—The present species is so different from the other *Eleutherodactyli* in Porto Rico, and in fact from all the species of this multitudinous genus that a special comparison with any of them is quite unnecessary. The declivous snout with the extreme posterior position of the nostrils are quite unique, and I know of no West Indian species which might be regarded as nearly allied. The uniform coloration above and below is also remarkable.

List of specimens of Eleutherodactylus unicolor.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
26963	.....	Camp El Yunque, Porto Rico, 2,978 feet altitude.	Feb. 26, 1900	L. Stejneger.....	Type.

Class REPTILIA.

Order SQUAMATA.

This order embraces the lizards and the snakes, which in most cases may be easily told apart by the former possessing legs. A small number of lizards, however, are entirely limbless, externally resembling snakes very closely. The only limbless lizards in Porto Rico are the amphisbænians, which are readily distinguished from the snakes by having no imbricate scales, the integument being divided by longitudinal and transverse grooves into squarish segments which form regular rings around the body.

Suborder SAURIA.

The lizards form the most numerous group of the reptiles in Porto Rico, there being no less than nineteen species out of a total of twenty-eight land reptiles.

KEY TO THE LIZARDS OF PORTO RICO, ACCORDING TO GENERA.

a^1 Four limbs.
  b^1 Head above covered with numerous scales or small plates.
    c^1 Eyelids rudimentary, not conniving; pupil vertical (fig 40). (*Gekkonidæ.*)
      d^1 Toes dilated at base, terminal phalanges compressed, free, raised angularly to the basal dilatation (figs. 44, 45) ..... HEMIDACTYLUS, p. 599.
      d^2 Toes dilated into a circular plate at tip only (fig. 50) ..... SPHÆRODACTYLUS, p. 602.
    c^2 Eyelids well developed, functional; pupil round ..... ANOLIS, p. 625.
      d^1 Toes with marked dilatations, but no "combs" (fig. 83). (*Iguanidæ.*)
      d^2 Toes simple; two of the posterior ones with lateral "combs" (fig. 125) ..... CYCLURA, p. 670.
  b^2 Head above with large, regular shields (fig. 67).
    c^1 Occipital shield absent.
      d^1 Ventral scales in quincunx. (*Scincidæ.*) ..... MABUYA, p. 607.
      d^2 Ventral scales in squarish series. (*Teiidæ.*) ..... AMEIVA, p. 612.
    c^2 Occipital shield present (fig. 73). (*Anguidæ.*) ..... CELESTUS, p. 621.
a^2 No limbs. (*Amphisbænidæ.*) ..... AMPHISBÆNA, p. 675.

Genus HEMIDACTYLUS[a] Oken.

1817. *Hemidactylus* OKEN, Isis, 1817, p. 1183 (based on Cuvier's Hémidactyles, type "Gecko tuberculeux Daudin").
1843. *Tachybates* FITZINGER, Syst. Rept., p. 105 (type *H. mabouia*).

HEMIDACTYLUS MABOUIA[b] (Moreau de Jonnès.)

1818. *Gecko mabouia* MOREAU DE JONNÈS, Bull. Soc. Philom. Paris, 1818, p. 138, (type locality, St. Vincent); Monogr. du Gecko mabouia, 1821, p. 1.—*Hemidactylus m.* DUMÉRIL and BIBRON, Erpét. Gén., III, 1836, p. 362 (Martinique).—DUMÉRIL, Cat. Méth. Rept. Mus. Paris, I, 1851, p.

[a] ἡμι, half; δάκτυλος, digit. [b] A Caribbean name attributed to several lizards.

39 (St. Vincent: type; Martinique, St. John, Spanishtown, Jamaica).—Reinhardt and Lütken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862 (1863), pp. 174, 275; author's separate pp. 22, 123 (St. Thomas, St. Croix, Just v. Dyck, Tortola).—Cope, Proc. Phila. Acad., 1868, p. 311 (Porto Rico).—Boulenger, Cat. Liz. Brit. Mus., I, 1885, p. 122 (Santo Domingo, Dominica).—Strauch, Mém. Acad. Sci. St. Pétersb., (7) XXXV, No. 2, 1887, p. 31 (Cuba, St. Thomas).—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 17 (St. Thomas).—Garman, Bull. Essex Inst., XIX, 1887, p. 18 (Santa Lucia, Petite Martinique, Martinique, Porto Rico, Trinidad).

1843. *Hemidactylus mabuya* Fitzinger, Syst. Rept., p. 105.

1843. *Hemidactylus mabuia* Cocteau in Sagra, Hist. Fis. Pol. Nat. Cuba, Hist. Nat., IV, p. 95, pl. xvi (Cuba).—Gundlach, Repert. Fisico-Nat. Cuba, II, No. 5, Apr., 1867, p. 12 (Cuba); Anal. Soc. Españ. Hist. Nat., IV, 1875, p. 358 (Cuba); X, 1881, p. 308 (Porto Rico).—Boettger, Kat. Rept. Mus. Senckenberg, I, 1893, p. 28 (Porto Rico).

Figs. 40–45.—Hemidactylus mabouia. 40, side of head; 41, top of head; 42, underside of head; 43, portion of upper surface of tail; 44, underside of hind foot. 2 × natural size. 45, lateral view of last joint of toe. 4 × natural size. No. 27630, U.S.N.M.

Description of adult male.—U.S.N.M. No. 27630; Mariel, Cuba;[a] May 9, 1900; Palmer and Riley, collectors. Rostral much broader than high, squarish, with a nick in the posterior margin for the anterior angle of the internasal and a median cleft extending forward for more than one-half the height of the shield, in contact with two supernasals and a small, somewhat irregular shield between the latter; first supralabial in contact with lower postnasal and reaching nostril; nostril between rostral, first supralabial and three scales behind and above, the upper one, or supranasal, being much the larger; twelve supralabials, including the small posterior one, the suture between eighth and ninth being under the center of the eye; top of head cov-

[a] There being no specimen of *Hemidactylus mabouia* from Porto Rico in our collection, one from Cuba is described instead.

ered with granules which are largest on the snout particularly so on the rostral canthus; eye equidistant between nostril and ear, its diameter being about one-half its distance from tip of snout; ear-opening, elongated, oblique, its diameter longer than greatest supralabial; temples granular like the top of the head with scattered, rounded tubercles; mental triangular, slightly wider than rostral, its free margin not twice as wide as nearest infralabials; seven larger infralabials; four chin-shields in a row, of which the median pair is much the larger, irregular hexagonal, their anterior angle fitting into the corner between mental and first infralabials, broadly in contact with each other on the median line and followed behind by four small shields somewhat larger than the succeeding granules of the throat; upper surface of body and flanks covered with granules about the size of those of the head, interspersed with large convex, but not keeled, tubercles, each about as long as three or four granules; these tubercles show a tendency to form irregular longitudinal rows, there being about sixteen across the middle of the back; throat covered with small flat uniform granules strongly contrasting with the imbricate cycloid scales of the rest of the underside and of the legs, the abdominal scales being slightly smaller than the dorsal tubercles, and about eleven contained in the distance from nostril to eye; on the underside of the thighs the three outer series of scales are larger, especially the last one, in which the scales are tongue-shaped with free tip and bearing near their base a pore, there being fourteen such pores on each femur, the series nearly meeting on the belly; fingers and toes free, all with long, compressed angularly raised and clawed distal phalanges; basal dilated portion with four pairs of lamellæ under inner toe and seven pairs under the middle one, in addition to the large unpaired terminal lamella; tail cylindrical, somewhat depressed, covered with small scales or large granules, slightly larger than those on the snout, and about six longitudinal rows of conical tubercles or spines in whorls about seven scales apart, underside with a median series of large plates, about two to a whorl; the regenerated portion of the tail with slightly larger irregularly arrayed scales without spines above or regular plates below.

Color (in alcohol) pale drab gray, indistinctly and irregularly mottled and spotted with dusky above.

Dimensions.

	mm.
Total length (tail partly reproduced)	116
Snout to vent	61
Vent to tip of tail (partly reproduced)	55
Snout to ear	16
Greatest width of head	12.5
Fore leg from axilla	20
Hind leg from groin	26
Axilla to groin	28

Habitat.—In 1881 Dr. Gundlach wrote that this species had not been observed by him in Porto Rico, but had been sent by Dr. Stahl, who had found it in a house at the capital, San Juan, adding that "it seems to be rare." Dr. Stahl does not give this species in his Fauna of the following year (1882), but on page 71 he mentions that Don Tomás Blanco, a pharmacist in Porto Rico, had met with "another species of the gecko family," which he himself had observed later on in Aguadilla and other places. It is probably the present species to which he refers. It was not collected by Mr. Baker, nor by any of the Fish Commission naturalists. Dr. Richmond and I were equally unsuccessful. However, the species was reported as having been sent from Porto Rico by Latimer as early as 1868, and Boettger mentions two specimens in the Museum Senckenbergianum donated in 1879 by Mr. Carl Knoblauch; Garman also mentions specimens from Porto Rico in the Museum of Comparative Zoology at Cambridge, Massachusetts, and, finally, I have recently examined a specimen in the museum in Hamburg collected by Mr. Herman Engel, in San Juan. *H. mabouia* is a species of extremely wide distribution. Besides having been found in various other West Indian islands, it occurs in many places in South America, South Africa, and Madagascar. It has probably been carried to many distant places in ships, and its occurrence in Porto Rico is undoubtedly due to a similar agency.

Genus SPHÆRODACTYLUS[a] Wagler.

1830. *Sphærodactylus* Wagler, Nat. Syst. Amph., p. 143 (type *S. sputator*).
1830. *Spheriodactylus* Guérin, Icon. Règne Anim., pl. xiv, fig. 6 (emend.).
1831. *Sphæriodactylus* Gray, in Griffith's Anim. Kingd. Synops., p. 52 (emend.).
1833. *Sphæriodactylus* v. d. Hoeven, Handb. Dierk., II, ii p. 344 (emend.).

The two species of *Sphærodactylus* found in Porto Rico and its dependencies may be easily distinguished by the size of the scales, as follows:

a^1. Number of scale rows around the middle of the body about 34–38,
S. grandisquamis, p. 602.

a^2. Number of scale rows around the middle of the body about 46–48,
S. monensis, p. 607.

SPHÆRODACTYLUS GRANDISQUAMIS,[b] new species.

1863. *Sphæriodactylus macrolepis* Reinhardt and Luetken, Vid. Meddel. Nat. Foren. (Copenhagen) 1862, pp. 174, 279; authors' separate, pp. 22, 127 (part, not of Guenther; island of Vieques).—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 705 (Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 308 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 70, 159 (Porto Rico).—*Sphærodactylus m.* Garman, Bull. Essex Inst., XIX, 1887, p. 21 (part: Porto Rico).

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[a] σφαῖρα, ball; δάκτυλος, digit. [b] With large scales.

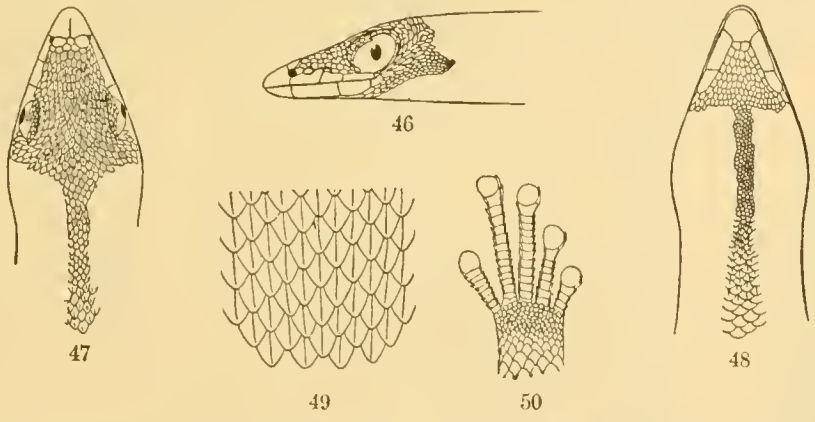
Diagnosis.—Dorsal scales very large, as large as those on belly, strongly keeled and imbricate; no granular scales on the vertebral line; scales on breast smooth, a few on fore neck faintly keeled; about 34 scale rows around the middle of the body; 8 dorsals in a head length (snout to ear opening); scales on top of head and temples strongly keeled, imbricate, largest on snout and temples; loreals juxtaposed.

Similar to *Sphærodactylus macrolepis* Günther, but dorsal scales much larger.

Type.—U.S.N.M. No. 27007; Luquillo, Porto Rico; March 4, 1900; L. Stejneger, collector.

Habitat.—Vieques and Porto Rico.

This *Sphærodactylus*, of which we now possess a large series, differs in no other respect from typical *S. macrolepis* from St. Thomas than in the size of the dorsal scales. I owe the opportunity of a direct comparison with specimens of the latter to the kindness of Prof. S. Garman. The Vieques and Porto Rican specimens agree completely, and their difference from the St. Thomas form is sufficient to warrant their separation by name.



FIGS. 46–50.—SPHÆRODACTYLUS GRANDISQUAMIS. 46, side of head; 47, top of head; 48, underside of head. 2⅔ × natural size. 49, scales on middle of back; 50, underside of hind foot. 4 × natural size. No. 27007, U.S.N.M.

Description of type specimen.—Adult; U.S.N.M. No. 27007; Luquillo, Porto Rico; March 4, 1900; L. Stejneger, collector. Snout rather pointed and elongate, the distance from the tip to the eye being slightly longer than from the latter to the ear opening, and nearly twice the diameter of the eye; rostral moderate with a long median cleft behind; nostril between rostral, first supralabial, two small postnasals and a large supranasal which is separated from its fellow of the other side by a small median scale, these three bordering the rostral above; three large supralabials (on the left side, four on the right) to the center of the eye; a prominent spine on the supereiliary margin over the middle of the eye; head above and on sides covered with small elongate, strongly keeled scales, those on the snout largest; scales on back large, imbricate, keeled, seven to eight in the distance from tip of snout to ear; mental large, nearly same size as rostral; two

very large infralabials followed by a very small one under the center of the eye; two small square chin-shields behind mental followed by flat smaller scales, becoming gradually smaller, almost granular on the middle of the throat, then gradually increasing backward on neck and chest, being imbricate and keeled on lower neck and chest; scales on abdomen still larger, but smaller than those on the back; limbs with smaller keeled imbricate scales; scales on tail above uniform, keeled, imbricate, below smooth, larger under the middle line, some widened so as to form rather irregular transverse plates.

Dimensions.

	mm.
Total length	58
Tip of snout to vent	30
Vent to tip of tail	28
Greatest width of head	5
Tip of snout to ear	7
Fore legs from axilla	7
Hind legs from groin	9

Coloration of living specimens.—Adult; U.S.N.M., No. 27007; L. Stejneger, No. 9045; Luquillo, March 4, 1900. General color tawny-olive, with indistinct marblings of darker raw umber; across the shoulders a wide, black band, edged anteriorly and posteriorly with whitish, and inclosing two pure white spots; underneath, pale isabella color; chin and throat, pure raw sienna; underside of tail suffused with russet; iris, brassy, overlaid with blackish, leaving a very narrow bright ring bordering the pupil.

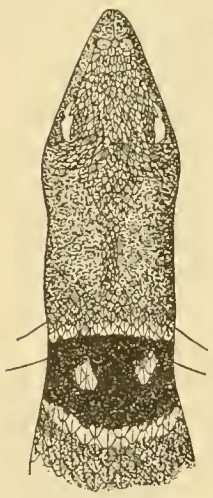


FIG. 51.—SPHÆRODACTYLUS GRANDISQUAMIS. $2\frac{2}{3}$ × natural size. Color pattern of head and shoulder. No. 27007, U.S.N.M.

Another specimen (No. 27008, L. S., No. 9046) caught with the one just described was duller, the general ground color being more dull isabella and the dark markings darker Van Dyke brown; the edges of the shoulder band like the ground color, but the two spots were pure white.

A number of young specimens collected at the same time were sooty black with few traces of darker markings, but all showed plainly the black shoulder band with the two white spots, and all had the extreme tip of the tail pure white.

All the above specimens which were brought us by the children in Luquillo, and which were said to have been caught inside the huts and houses of the natives differed notably in coloration from the specimens which we ourselves collected afterwards, both in Vieques and near Ponce, under stones far from human habitations.

Three of the specimens on the beach at Vieques (Nos. 27142–4; L. S.,

No. 9055) on March 26, were isabella-colored with dusky spots on back and upper side of legs, the tail similar but more ochraceous; the scapular band less extensive than in the Luquillo specimens, and without white edges, in two specimens jet black with pure white spots; in the third, the scapular band was merely indicated, the great difference being in the color of the head including chin and throat and part of the neck which were uniform, unspotted, orange-ochraceous, approaching ochraceous-rufous, the black eyeball shining through the skin as greenish spots; breast, belly, and legs underneath, pale drab, and underside of tail, ochraceous. The fourth specimen (No. 27145; L. S., No. 9056) was entirely different; the whole upper surface was tawny olive with dusky irregular spots; on the shoulder, traces of the black shoulder band with the white spots; the head was of the same ground color as the rest of the upper surface, but with markings of a similar pattern as fig. 52; throat and chin with very distinct irregular dusky spots.

In the specimens collected in the white clay hills about 3 miles east of Ponce on April 16 (Nos. 27306–12) two similar types of coloration are also easily distinguishable, namely, those with uniform yellow head without dusky markings but with the tail spotted like the back, and those with an unspotted ochraceous tail but a drab-colored head with a pattern, like fig. 52, and longitudinal dusky marks on the back. In all these specimens the scapular band is limited to a black median spot.

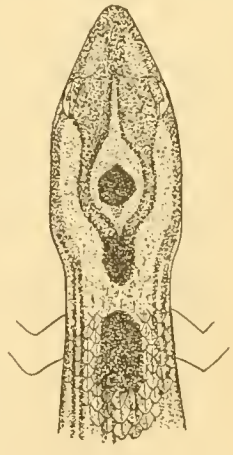


FIG. 52.—SPHÆRODACTYLUS GRANDISQUAMIS. $2\frac{2}{3}$ × natural size. Color pattern of head and shoulder. No. 27312, U.S.N.M.

Habitat.—*Sphærodactylus grandisquamis*, which is the form with the largest scales, is confined to Porto Rico and Vieques. On the east it is represented in St. Thomas and the other Virgin Islands by *S. macrolepis*, with smaller scales, while on the west a form with still smaller scales is found on Mona Island.

As early as 1863 Reinhardt and Luetken recorded a large-scaled individual from Vieques and it has since been recorded from Porto Rico by various authors as *S. macrolepis*. Mr. A. B. Baker in 1899 collected several specimens near Isabella Segunda on Vieques, where we also secured a few in 1900. We also collected a large series in Luquillo, a small town on the main island just opposite, and later on some near Ponce, on the south side. I have also examined four specimens in the Hamburg Museum, collected by Mr. J. Michaelis at Arecibo in 1900. It thus seems to occur all around the island near sea level; it is probably confined to the lowlands, as we did not see it nor hear of it in the higher altitudes.

Habits.—Like most geckos the Lucia or Santa Lucia, as the *Sphærodactylus* was called by the natives, is probably nocturnal or crepuscular, as we saw none except such as we caught under stones or in other hiding places. The children in Luquillo brought us numerous specimens which were said to have been taken in the huts of the natives, though we saw none in the miserable shanty which we ourselves inhabited. On Vieques we found a few specimens on the beach near Isabella Segunda under the pebbles of surf-worn coral of the size from a walnut to that of a fist. In the white limestone hills east of Ponce we also found them under small stones.

List of specimens of Sphærodactylus grandisquamis.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
25549	Adult	Vieques Island	Feb. 7, 1899	A. B. Baker	
25550	do	do	do	do	
25551	do	do	do	do	
25552	do	do	do	do	
25553	do	do	do	do	
27007	do	Luquillo, Porto Rico	Mar. 4, 1900	L. Stejneger	Type, p. 603.
27008	do	do	do	do	Description, p. 604.
27009	do	do	do	do	
27010	do	do	do	do	
27011	do	do	do	do	
27012	do	do	do	do	
27013	do	do	do	do	
27014	do	do	do	do	
27015	do	do	do	do	
27016	do	do	do	do	
27017	do	do	do	do	
27018	Young	do	do	do	
27019	do	do	do	do	
27020	do	do	do	do	
27021	do	do	do	do	
27022	do	do	do	do	
27023	Adult	do	do	do	
27024	do	do	do	do	
27025	do	do	do	do	
27026	do	do	do	do	
27027	do	do	do	do	
27028	do	do	do	do	
27029	do	do	do	do	
27030	do	do	do	do	
27031	do	do	do	do	
27032	do	do	do	do	
27033	do	do	do	do	
27034	do	do	do	do	
27035	do	do	do	do	
27036	do	do	do	do	
27037	do	do	do	do	
27038	do	do	do	do	
27039	do	do	do	do	
27040	do	do	do	do	
27041	do	do	do	do	
27042	do	do	do	do	
27043	do	do	do	do	

List of specimens of Sphaerodactylus grandisquamis—Continued.

U.S. N.M. No.	Age.	Locality	When collected.	By whom collected.	Remarks.
27044	Adult...	Luquillo, Porto Rico.....	Mar. 4, 1900	L. Stejneger.....	
27045	....do...	.....do.....	.....do.....	.....do.....	
27142	....do...	Vieques Island.....	Mar. 26, 1900	.....do.....	Description, p. 604.
27143	....do...	.....do.....	.....do.....	.....do.....	
27144	....do...	.....do.....	.....do.....	.....do.....	
27145	....do...	.....do.....	.....do.....	.....do.....	Description, p. 605.
27305	Young..	Ponce, Porto Rico.....	Apr. 16, 1900	C. W. Richmond .	Near military road, 3 miles east of city.
27306	Adult...	.....do.....	.....do.....	L. Stejneger	Description, p. 605.
27307	....do...	.....do.....	.....do.....	.....do.....	Do.
27308	....do...	.....do.....	.....do.....	.....do.....	Do.
27309	....do...	.....do.....	.....do.....	.....do.....	Do.
27310	....do...	.....do.....	.....do.....	.....do.....	Do.
27311	....do...	.....do.....	.....do.....	.....do.....	Do.
27312	....do...	.....do.....	.....do.....	.....do.....	Do. Fig. 52.

SPHAERODACTYLUS MONENSIS[a] (Meerwarth).

1901. *Sphaerodactylus macrolepis* α *monensis* MEERWARTH, Mitth. Naturh. Mus. Hamburg, XVIII, p. 20 (type locality, Mona Island; types, Hamburg Mus., nos. 1207a–b).

This form is diagnosed by Mr. Meerwarth as having 46 to 48 scale rows around the body and as having the scales on the upper side of the snout imbricate.

Through the kindness of the authorities of the Naturhistorische Museum in Hamburg I was allowed to examine the two type specimens. I found the scales decidedly smaller than in specimens of *S. macrolepis* from St. Thomas, consequently still smaller than in *S. grandisquamis*. The specimens are quite young and pale. On the smallest there are indications of the shoulder band. The scales on the chest are keeled.

Habitat.—This species seems to be confined to Mona Island, where a couple of specimens were collected in 1891 by Mr. Bock and sent to the museum in Hamburg.

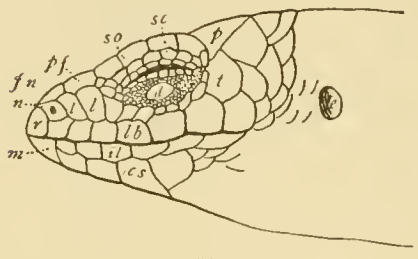
Genus MABUYA[b] Fitzinger.

1826. *Spondylurus* FITZINGER, Neue Class. Rept., p. 23 (type *Scincus sloanii* DAUDIN).
1826. *Mabuya* FITZINGER, Neue Class. Rept., p. 23 (type *M. carinata* FITZINGER).
1830. *Euprepis* WAGLER, Nat. Syst. Amph., p. 161 (type *S. multifasciatus* KUHL).
1834. *Euprepes* WIEGMANN, Herpet. Mex., p. 36 (emended).
1845. *Mabouya* GRAY, Cat. Liz. Brit. Mus., p. 93 (emended).
1848. *Elabites* GISTEL, Naturg. Thierr., p. ix (subst. for *Euprepis* WAGLER)
1862. *Mabuia* COPE, Proc. Phila. Acad., 1862, p. 185 (emended).

[a] *Monensis*=from Mona Island.

[b] A word of Carib origin applied to several kinds of lizards.

The Slippery-backs, as these skinks (*Scincidæ*) are called by the English-speaking people of the Antillean islands because of their smooth, shiny surface, belong to a family of lizards widely distributed over the Tropics of both hemispheres. They are not numerous in America, however, and in the territory we are here dealing with only one species occurs.



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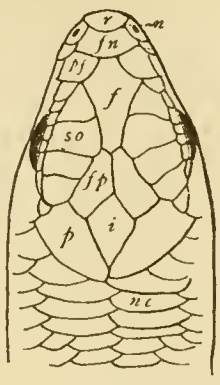

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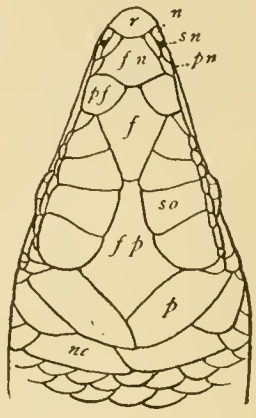

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FIGS. 53–55.—HEAD-SHIELDS OF SCINCID LIZARD. *cs*, Chin-shields; *d*, disk on lower eyelid; *e*, ear-opening; *f*, frontal; *fn*, frontonasal; *fp*, frontoparietal; *i*, interparietal; *il*, lower labials; *l*, loreals; *lb*, upper labials; *m*, mental; *n*, nasal; *nc*, nuchals; *p*, parietals; *pf*, prefrontal; *pn*, postnasal; *r*, rostral; *sc*, supraciliaries; *sn*, supranasal; *so*, supraocular; *t*, temporal.

MABUYA SLOANII.[a] (Daudin.)

1803. *Scincus sloanii* DAUDIN, Hist. Nat. Rept., IV, p. 287, pl. LV, fig. 2 (type locality not stated; type in Mus. Paris; said by Duméril and Bibron to be from St. Thomas, collected by Richard père). —*Eumeces s.* DUMÉRIL and BIBRON, Erpét. Gén., V, 1839, p. 639 (St. Thomas).—DUMÉRIL, Cat. Méth. Rept. Mus. Paris, I, 1851, p. 156.—*Mabuya s.* BOCOURT, Miss. Sci. Mex., Zool., Rept., livr. 6, 1879, p. 401, pl. XXII B, figs. 3–3*c* (St. Thomas; fig. 3*b* is from the type).—*Mabuia s.* BOULENGER, Cat. Liz. Brit. Mus., III, p. 193 (part: St. Croix); Jahresber. Naturw. Ver. Magdeburg, 1894–1896, p. 113 (Mona Island).—MEERWARTH, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 37 (Mona I.).

1838. *Tiliqua richardi* GRAY, Ann. Nat. Hist., II, Dec. 1838, p. 292 (type locality St. Thomas; type in Mus. Paris; same specimen as type of *S. sloanii* Daudin).

1845. *Mabouya sloanei* GRAY, Cat. Liz. Brit. Mus., p. 94 (locality, Jamaica, erroneously; Paris Mus.).

1859. *Mabouia ænea* GUENTHER, Ann. Mag. Nat. Hist., (3) IV, Sept. 1859, p. 212 (St. Croix) (not of Gray).

1862. *Mabuia cuprescens* COPE, Proc. Phila. Acad., 1862, p. 186 (type locality, St. Thomas, W. I., coll. Riise).

1863. *Gongylus* (*Eumeces*) *agilis* REINHARDT and LUETKEN, Vid. Middel. Naturh. Foren. (Copenhagen), 1862, p. 229; author's separate, p. 77 (St. Thomas, St. John, Just v. Dyck, Mus. Copenh., Vieques, according to Riise).

1868. *Mabuya fulgida* COPE, Proc. Phila. Acad., 1868, p. 311 (Porto Rico) (not of 1862).

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[a] Named for Hans Sloane, 1660–1753, who, in his Voyage to the Islands Madera etc., (London, 1707) described a skink from Jamaica, which Daudin believed to be the same as the present species.

1881. *Euprepes spilonotus* Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 311 (Porto Rico) (not of Wiegmann 1837).—*Euprepes* (*Mabuia*) *spilonotus* Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 708 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, p. 159 (Porto Rico).

1887. *Mabuia nitida* Garman, Bull. Essex Inst., XIX, 1887, p. 51; extr. p. 27 (type localities, Porto Rico and Santo Domingo; types in Mus. Comp. Zool. Cambr.).

A direct comparison between the six typical specimens of *M. fulgida* from Jamaica (U.S.N.M., No. 5759) and the specimen from Porto Rico here figured and described, for the loan of which I am greatly indebted to Prof. S. Garman, convinces me that Bocourt and Garman are correct in regarding them as distinct forms. I can not agree, however, with Professor Garman in the nomenclature he proposes, following Boulanger, as he does, in ascribing the name *M. sloanii* (Daudin) to the Jamaican form. True, Daudin referred Sloane's *Lacertus minor lævis*, from Jamaica, to his *Scincus sloanii* under the impression that it was the same species as the specimen he described as being in the "Museum d'histoire naturelle de Paris," without giving the locality of the latter, but we have Duméril and Bibron's express statement to the effect that his type was collected in St. Thomas by Richard père,[a] and according to modern rules of nomenclature the name follows the type. It is consequently the Jamaican form which requires a different name, Wiegmann's *M. spilonotus* being apparently available for this form.

I have been unable to find any character by which the Porto Rico specimen can be separated from typical *M. sloanii*. The type of the latter has a somewhat abnormal arrangement of the frontonasal and the prefrontals, the former being very short and the latter broadly in contrast, but on the whole the St. Thomas form seems to be the same as the Porto Rican.

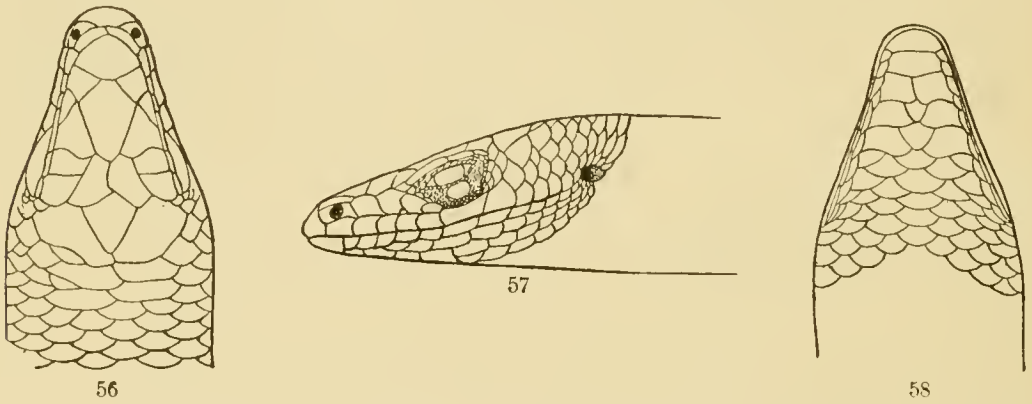
Professor Garman has pointed out the characters separating the two forms from Jamaica and Porto Rico, though I must add that one of the characters, namely, the alleged lower number of scales from chin to vent in the Jamaican species does not seem to hold, as in our series the number varies from 48 to 60. On the other hand, there is a strong tendency in the Jamaican form towards three pairs of nuchals. Of the six specimens before me there is only one specimen with two pairs of nuchals; two have 3 on one side and 2 on the other; while three specimens have three pairs of enlarged nuchals.

It must be admitted that no one single character seems to be absolutely constant, but it is believed that it will always be possible to refer a specimen to its proper category by a combination of the dominant characters. Thus, separated supranasals and three pairs of

[a] Plus tard, Daudin en publia une description d'après l'individu même que nous venons d'écrire ici. * * * Nous possédons un seul exemplaire qui a été recueilli dans l'île de Saint-Thomas, l'une des Antilles, par Richard père.

nuchals seem to predominate in Jamaican specimens, while supranasals in contact and two nuchals belong more to the eastern form.

During my visit to Berlin in 1901 I was enabled to examine two interesting type specimens in the Natural History Museum there, thanks to the kindness of the curator, Dr. G. Tornier. They were *Euprepes semitæniatus* and *E. spilonotus*, both described by Wiegmann from unknown localities. The latter (No. 3785) has three pairs of nuchals and the supranasals are not in contact, thus agreeing with the Jamaican form. The other (No. 5290), *E. semitæniatus*, has two pairs of nuchals and the supranasals are in contact; it has also 32 scale rows around the body. In these respects it agrees with *M. sloanii*, but the coloration is so different and so peculiar that I can not refer it to this species. On the head and anterior portion of the body there are two very dark brown longitudinal bands, with a narrow, light band on the middle line. The dark bands gradually taper off posteriorly, disappearing on the middle of the back. The lateral dark band is traceable to the groin.



FIGS. 56–58.—MABUYA SLOANII. 2 × natural size. 56, top of head; 57, side of head; 58, underside of head. No. 6052, M.C.Z.C.

Description of adult.—Mus. Comp. Zool. Cambr. No. 6052; Porto Rico. Head depressed, snout moderate; supranasals broadly in contact behind the rostral separating the latter from the frontonasal, which is broader than long and in contact with frontal; nasal irregularly trapezoidal with the large nostril in the posterior half; a small postnasal; two loreals, the posterior about twice as large as the anterior; prefrontals separated, in contact with both loreals, just touching second supraocular; frontal about as long as its distance from posterior end of interparietal, in contact with second supraocular only; four supraoculars, first small, scarcely touching frontal, second largest, just touching prefrontal; four superciliaries, second very long; two frontoparietals in contact with second, third, and fourth supraoculars; an interparietal, behind which the parietals are in contact; two pairs of enlarged nuchals; a transparent disk on lower eyelid; temporals large; the sixth supralabial forming a long subocular, there being five subequal supralabials anterior to it; mental followed

by an unpaired postmental and three chin-shields on each side, the first pair being in contact on the middle line, the posterior two separated by a median scale; ear opening round, small, about the size of the disk of the lower eyelid, without projecting scales in front; dorsal scales perfectly smooth; 32 scales round the middle of the body, 61 on middle line from chin to vent; limbs overlapping when pressed against the side; vent bordered anteriorly by six scales, the two middle pairs somewhat enlarged.

Color (in alcohol) above bronzy tawny olive with a pale dorsolateral band extending from the supranasals over the superciliaries to the middle of the body where it gradually disappears; this band is bordered above by a narrow and often disconnected line of dark brown spots and below by a broad dark brown band from nostrils over ear and shoulder, gradually becoming lighter and disappearing on the groin; labials and lower parts pale olive buff with a touch of bluish, labials dark edged; sides of neck in front of shoulder and upper parts of limbs spotted with dark brown.

Dimensions.

	mm.
Snout to vent	73
Snout to ear opening	14.5
Axilla to groin	36
Fore limb	20
Hind limb	25
Tail	defective.

Variation.—This species, like all the others of the genus, shows considerable variation, especially in the head shields. Thus, the type has a remarkably short frontonasal, behind which the prefrontals are broadly in contact. Sometimes there are only four supralabials in front of the so-called subocular, which in this case is the fifth labial. Garman states that there are occasionally only three supraoculars, and that the number of scales on median line between chin and vent varies from 60 to 63, but a larger series would probably show a greater variation. The normal number of scales around the body is stated to be 30.

The two specimens recorded by Boulenger from Mona Island have the supranasals touching behind the ventral without forming a suture; frontonasal broader than long; five or six supralabials anterior to subocular; 32 scales around the body; typical coloring.

Three specimens from Mona Island in the museum at Hamburg (No. 1476 a–c) have all two pairs of nuchals and two pairs of chin-shields in contact; in two specimens the supranasals are in contact, while in one they are barely separated. A fourth specimen (No. 1206) has the supranasals similarly arranged and in addition three pairs of nuchals.

Habitat.—This species, which is recorded from Vieques (Riise), Porto Rico (Cope, Peters, Gundlach, Stahl, Garman), and Mona (Boulenger, Meerwarth), must be quite rare now, as it was not seen either by Mr.

Baker and the rest of the U. S. Fish Commission party nor by Dr. Richmond and myself. Its present scarcity is probably due to the mongoose.

Mabuya sloanii occurs also in the Virgin Islands, and according to Garman the form inhabiting Haiti is identical with the Porto Rican species.

Genus AMEIVA[a] Meyer.

1795. *Ameiva* Meyer, Synops. Rept., p. 27 (type *A. americana* = *Lacerta ameiva*).
1820. *Amaiva* Kuhl, Beitr. Zool., p. 115 (emend.).
1840. *Amieva* Gray, Ann. Nat. Hist., V, p. 114 (error).
1843. *Scolocnemis* Fitzinger, Syst. Rept., p. 20 (type *A. lateristriga*).
1843. *Pholidoscelis* Fitzinger, Syst. Rept., p. 20 (type *A. major*).
1871. *Amiva* Cope, Proc. Phila. Acad., 1871, p. 220 (emend.).

The family Teiidæ, to which the Ameivas belong, represent in the New World the Old World typical Lacertidæ. Some of the species, like the South American "Teju," reach a considerable size. In places where the true Iguana does not occur, as in Porto Rico, they are often known to the inhabitants by this name.

Within our area only two forms occur, namely, *Ameiva exul*, in Porto Rico and Vieques, and the form recently described by Boulenger as *A. alboguttata* from Mona Island. They are very closely related, the latter being plainly descended from the former. The main differences are as follows:

a^1 Generally white-spotted only on the posterior half of the back; femoral pores averaging 15.5 on each side; number of scales in fifteenth tail segment from base averaging 45; median gulars forming a group of slightly enlarged scales; plates on upper arm much wider than long ..... *A. exul*, p. 612.

a^2 Back with white spots to the neck; femoral pores averaging 13.3 on each side; number of scales in fifteenth tail segment from base 34; median gular group of enlarged scales less differentiated, often confluent with the adjoining scales; plates on upper arm slightly wider than long ..... *A. alboguttata*, p. 618.

AMEIVA EXUL[b] (Cope).

1862. *Ameiva plei* Cope, Proc. Phila. Acad., 1862, p. 65 (not of Duméril and Bibron); (St. Thomas, Santa Cruz, Porto Rico).—Peters, Mon. Ber. Berlin. Akad. Wiss., 1876, p. 708 (Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 311 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 69, 158 (Porto Rico).
1862. *Ameiva plei* var. *exul* Cope, Proc. Phila. Acad., 1862, p. 66 (type locality, Water Island; type U.S.N.M. No. 30696; A. H. Riise, collector).
1863. *Ameiva riisei* Reinhardt and Luetken, Vid. Meddel. Naturh. Foren., (Copenhagen) 1862, p. 232; authors' separate, p. 80 (St. Thomas, St. Croix, St. John, Water Island, Vieques, Porto Rico).—Bocourt, Miss. Sci. Mex., Zool., Rept., 1874, livr. 4, pl. xx, *B*, figs. 3–3*c* (St. Thomas).

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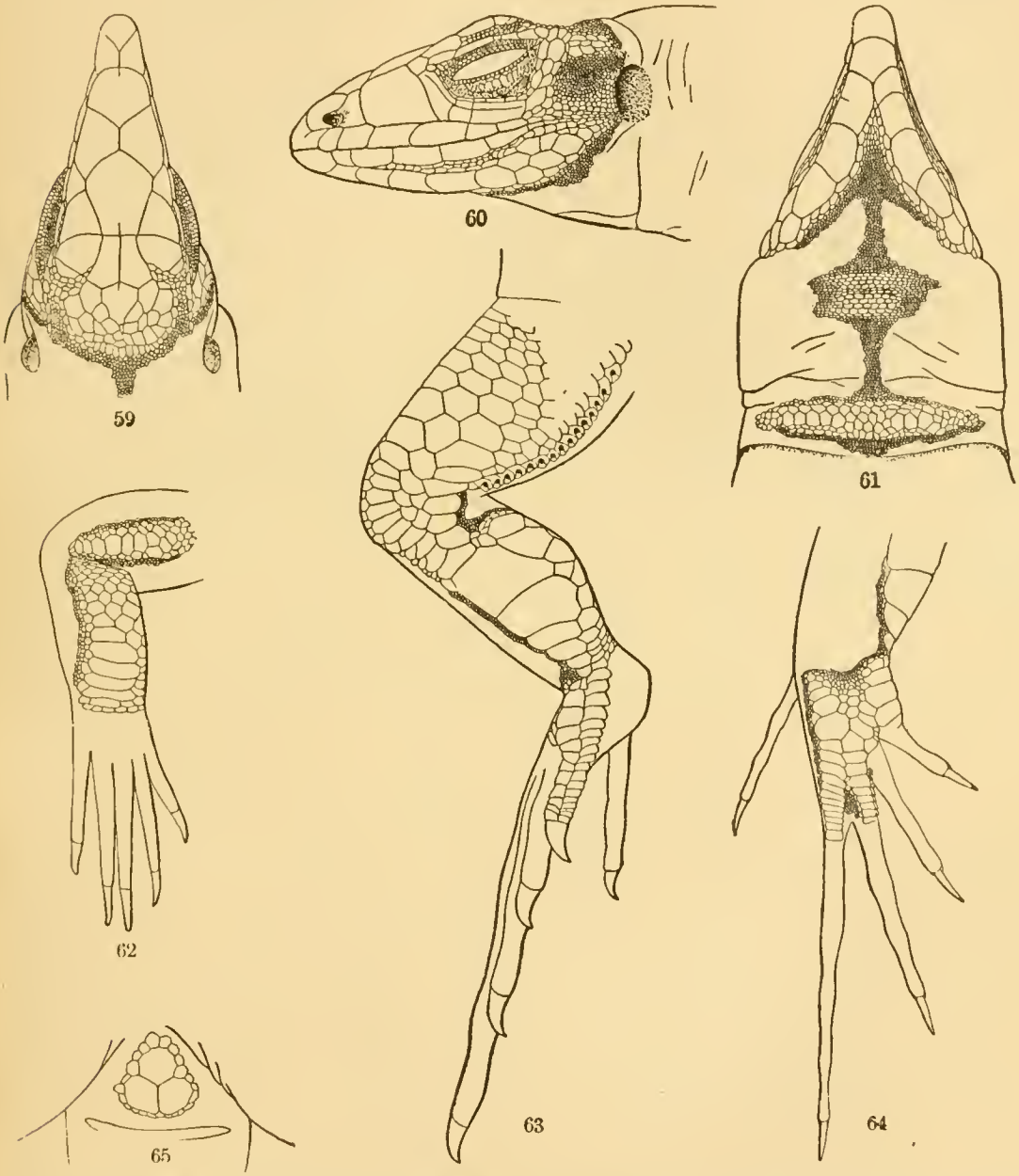
[a] Said to be a local South American name; first mentioned by Margrave.
[b] A wanderer; an exile.

1885. *Ameiva riisii* Boulenger, Cat. Liz. Brit. Mus., II, p. 354 (St. Thomas).—Garman, Bull. Essex Inst., XIX, 1887, p. 11 (Porto Rico).—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 30, pl. II, figs. 7–9 (St. Thomas).

1893. ?*Ameiva vittipunctata* Boettger, Kat. Rept. Mus. Senckenberg., I, p. 74 (Porto Rico) (not of Cope).

A minute comparison of the large number of specimens brought home by the expedition with the type of *A. exul* and with a good



Figs. 59–65.—Ameiva exul. 1½ × natural size. 59, top of head; 60, side of head; 61, underside of head; 62, dorsal view of fore leg; 63, ventral view of hind leg; 64, dorsal view of hind foot; 65, preanal plates. No. 27221, U.S.N.M.

series of specimens from St. Thomas, the type locality of *A. riisei*, fails to show the slightest structural difference, and thus verifies the results arrived at by Reinhardt and Luetken and by Garman. The color difference pointed out by the latter I have failed to appreciate in the specimens under my observation, which show an amazing individual variation in this respect.

Cope's variety *exul* is only the young of the present species, and as his paper clearly has the priority over that by Reinhardt and Luetken (in fact they refer to it themselves) the name given by him must take precedence over *A. riisei*.

Description.—Adult; U.S.N.M. No. 27221; Utuado, Porto Rico, April 7, 1900; L. Stejneger collector.—Rostral forming an acute angle behind; nostril between two nasals; anterior pair of nasals broadly in contact behind rostral; frontonasal longer than wide, in contact with nasals, loreal and prefrontals; prefrontals broadly in contact; frontal pentagonal, in contact with first and second supraoculars, just touching the third; a pair of frontoparietals in contact with third supraocular anteriorly; five occipitals in a transverse row, the median largest; six or seven superciliaries; four supraoculars, the first in contact with two anterior superciliaries, and separated from the loreal by the first of the latter; three posterior supraoculars separated from superciliaries by a double row of granules; last two supraoculars separated from outer occipitals by three rows of small scales or granules; loreal undivided; six large supralabials, first in contact with both nasals, second with posterior nasal and loreal; temples granular surrounded by larger scales; mental followed by an unpaired postmental; five large infralabials; first pair of chin-shields separated by granules of the chin; between infralabials and chin-shields a wedge of one to three granules extending anteriorly nearly to the postmental; chin and throat covered with minute granules of slightly varying size, a faintly indicated band of slightly larger ones extending across the middle in which again the median ones are forming an ill-defined central group of somewhat enlarged scales; on the portion between the two throat folds (the so-called mesopthychium) several rows of larger hexagonal scales; back, sides, and upper side of limbs covered with very fine uniform granules; underside of body with ten longitudinal and thirty-five transverse rows of square plates; three large preanal shields forming a triangle; on the lower arm a series of very wide plates (antebrachials) decreasing in width toward the elbow joint by being dissolved into several rows of smaller hexagonal scales; on the upper arm a similar but narrower series of plates (brachials or humerals) not continuous with the antebrachial series; on the posterior side near the elbow a small group of enlarged scales (postbrachials); underside of thighs covered with six or seven series of hexagonal plates, of which three rows are considerably larger than the others; fourteen to fifteen femoral pores; on the underside of tibia two rows of plates, two of the plates of the outer row being enormously enlarged; upper side of wrist with regular series of transverse plates correspond-

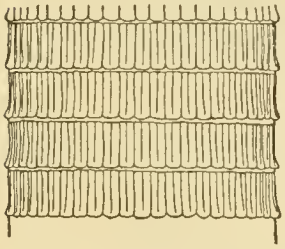


FIG. 66.—AMEIVA EXUL. 2× natural size. Dorsal view of portion of tail. No. 27221, U.S.N.M.

ing to the inner and outer metatarsals; fifth (outer toe)extending as far as the first (inner); tail covered with keeled scales in rings, the scales being straight and the keels nearly parallel with the sides of the scales; about forty-three scales in the fifteenth ring from the base.

Dimensions.

	mm.
Total length (tip of tail reproduced)	310
Snout to vent	108
Tail (tip reproduced)	202
Snout to ear	26
Width of head	16
Fore leg from axilla	39
Hind leg from groin	77
Outer toe without claw	11
Inner toe without claw	6

These dimensions are only those of a medium-sized individual. The largest specimen in our collection (No. 25570, from Cayo Santiago, off the Playa de Humacao) measures to the vent 160 mm. and to the tip of the tail 470 mm., but I am sure that some of the specimens of apparently patriarchal age which I saw in the city of San Juan near the quartermaster's wharf were considerably larger.

Coloration of living specimens.—Adult; U.S.N.M. No. 27146; L. Stejneger No. 9057; Arecibo, April 3, 1900.—Ground color above of old skin (the specimen was shedding) "pea green," of new skin more olive green, the difference being slight, however; underside pale "pearl gray" with a decided wash of "turquoise blue" on the groin and tail; dark markings blackish; eyelids edged with whitish; iris very dark brown.

A somewhat larger specimen (*male*), U.S.N.M. No. 27221; L. Stejneger No. 9065; Utuado, April 7, 1900, had the ground color above tawny olive becoming olive gray on the tail; head not colored differently from back; lower back with a broken network of black meshes; flanks with a series of vertical black spots on a slightly browner ground alternating with a double or triple series of pale dots, which continue indistinctly on hind legs and sides of tail; tip of snout and of lower jaw pink flesh color; sides of head pale drab; underside whitish with a bluish cast, which is strongest on the sides and under hind legs and tail.

A specimen (*young*) (No. 27222; L. Stejneger No. 9066) from the same locality as the last had head and neck uniform tawny olive; ground color of back similar, but becoming duller toward the tail, which is drab above; ground color of flanks similar, though more russet nearer the light lateral line, especially anteriorly; sides of head and neck nearly uniform pale cinnamon; a narrow pale cream-buff line from superciliaries slightly broadening on the back and fading out at about the posterior third of the back, margined with blackish on both

sides; on back and flanks a series of narrow blackish crossbars becoming obsolete on the lower back, the interspaces filled with roundish isabella-colored spots; lower back similarly spotted, as are also the upper side of the legs; tail above with these spots more faintly indicated; underside whitish with a turquoise-blue suffusion on both sides of abdomen and under the tail; underside of thighs pale gray dappled with white round spots like those on the back.

Variation.—In the large series of specimens before me (58) there is considerable variation in minor structural characters. Thus the number of superciliaries varies between 6 and 8; the upper labials between 5 and 8 (normally 6), lower labials between 5 and 6 (normally 5); the number of supraoculars is fairly constant at 4, sometimes one may be abnormally divided; in one instance the third supraocular is entirely separated from the frontoparietal by granules; the occipitals are of very variable size and shape, the median, perhaps, more often smaller than the next pair than otherwise; the central group of enlarged throat scales, or gulars, is of very variable aspect. The ventrals are nearly always in 10 longitudinal rows, and the transverse rows vary from 34 to 39, averaging about 35. The number of anal plates is by no means limited to 3. Frequently there are 5, two narrower ones being added, one on each side, to the two posterior plates, or even 6 when the anterior plate is divided by a transversal suture. Femoral pores, from 12 to 18 on each side; of sixty-seven specimens, three have 12; one, 13; eight, 14; twenty-five, 15; eighteen, 16; eight, 17, and four have 18, the average being 15.4 and the vast majority of specimens having 15 or 16 pores.

The coloration is still more variable. Specimens with or without white dots, with or without stripes, are found in all localities. There are quite young specimens with comparatively few markings, but as a rule the spots and stripes become more and more obsolete with age. The pink color of the tip of the snout is also present in a varying degree, many having no trace of this tint.

Habitat.—The ameiva, or, as this ground-lizard is generally though erroneously called by the natives, the iguana, is common all around the coast line of Porto Rico in the neighborhood of water, salt or fresh, preferably where the ground is sandy or gravelly. In the interior it follows up the river courses, but it does not reach a high altitude. Thus, on the Rio Grande de Loiza the U. S. Fish Commission party found it as far up as Caguas, while on the Rio Grande de Arecibo we traced it to Utuado.

This species is also common in Vieques, St. Thomas, and the other Virgin Islands. It is represented in Mona Island by a closely allied form.

List of specimens of Ameiva exul.

U. S. N. M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
25448	Half gr.	San Juan, Porto Rico	Jan. 6, 1899	A. B. Baker	
25449	Young.	do	do	do	
25450	do	do	do	do	
25521	Adult	Utuado, Porto Rico	Jan. 28, 1899	do	
25570	do	Caya Santiago, Porto Rico	Feb. 15, 1899	do	
25571	do	Off port of Humacao, Porto Rico.	do	do	
25572	do	do	do	do	
25573	do	do	do	do	
25574	Half gr.	do	do	do	
25575	Adult	do	do	do	
25576	do	do	do	do	
25577	do	do	do	do	
25578	do	do	do	do	
25579	do	do	do	do	
25581	Half gr.	Arroyo, Porto Rico	Feb. 4, 1899	do	
25582	do	do	do	do	
25583	do	do	do	do	
25584	do	do	do	do	
25585	do	do	do	do	
25608	Young.	Ponce, Porto Rico	Jan. 31, 1899	do	
25635	Half gr.	Cataño, Porto Rico	Jan. 4, 1899	U. S. Fish Commission Fish-hawk.	
25636	do	do	do	do	
25637	Young.	do	do	do	
25638	do	do	do	do	
25640	do	San Juan, Porto Rico	do	do	
25641	do	do	do	do	
25654	Adult	Cataño, Porto Rico	Jan. 12, 1899	do	
25655	do	do	do	do	
25656	Half gr.	do	do	do	
25657	do	do	do	do	
25658	do	do	do	do	
25659	Young.	do	do	do	
25660	Adult	San Juan, Porto Rico	Jan. 17, 1899	do	
25661	do	do	do	do	
25662	do	do	do	do	
25663	do	do	do	do	
25664	do	do	do	do	
25665	Half gr.	do	do	do	P. 618.
25666	do	do	do	do	
25667	do	do	do	do	P. 618.
25668	do	do	do	do	
25669	do	Caguas, Porto Rico	Jan. 9, 1899	do	
25670	do	do	do	do	
25720	Young.	San Juan, Porto Rico	Jan. 7, 1899	do	
27046	do	Luquillo, Porto Rico	Mar. 7, 1899	L. Stejneger	
27146	Adult	Arecibo, Porto Rico	Apr. 3, 1899	do	Description, p. 615.
27221	do	Utuado, Porto Rico	Apr. 7, 1899	do	Description, fig., pp. 613-614.
27222	Young.	do	Apr. 9, 1899	do	Description, p. 615.

AMEIVA ALBOGUTTATA[a] Boulenger.

1896.—*Ameiva alboguttata* BOULENGER, Jahresber. Naturw. Ver. Magdeburg, 1894–1896, p. 112 (type locality, Mona Island; types in Mus. Magdeburg).—MEERWARTH, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 32, pl. II, figs. 6–8 (Mona Island).

This form is so much like *Ameiva exul*, from Porto Rico proper, that a detailed description is unnecessary. It will suffice to indicate in what respect the Mona Island specimens differ from the typical species.

The main difference seems to be one of coloration. Judging from the alcoholic specimens, the Mona form is considerably paler than those from Porto Rico proper. The white dots, as a rule, are more numerous and extend farther forward on the back to between the shoulders or slightly beyond, and it is probable that these spots do not disappear with age, at least to the same extent as in the old *A. exul*. There are young specimens of the latter, however, which are fully as spotted as *A. alboguttata*, thus, for instance, Nos. 25665 and 25667, from San Juan, Porto Rico. In the young *A. alboguttata* there is also present a more or less continuous white line between axilla and groin, but this line disappears entirely in older specimens. It is only indicated in a few young *A. exul*.

In spite of the great variation in the size of the scales on the tail it seems possible to establish an average difference between the two forms. In 31 specimens of *A. exul* in which the scales in the fifteenth tail segment from the base were counted the number varied between 38 and 54, considerably more than one-half having 44 to 48 scales, the average being 45.3. In the 7 specimens of *A. alboguttata* at hand the scales in the fifteenth segment of the tail from its base numbered from 33 to 38, the average being 34.4.

The gular scales are exceedingly variable. As in typical *A. exul* there is a median enlarged group, but it is not equally conspicuous in all specimens. Sometimes it is fairly well defined, as in No. 29368; in others the difference between these median scales and the adjacent ones on both sides is so slight that they seem to form a band of nearly equal scales across the throat, as in No. 29369; while in others again the decrease in size of the scales from the median ones is so gradual in all directions that no specially differentiated group can be made out. Whatever difference there is in the covering of the throat in the two forms seems due to the scales surrounding the median group being on the whole slightly larger in *A. alboguttata* than in *A. exul*. The difference is one of slight degree, not of kind.

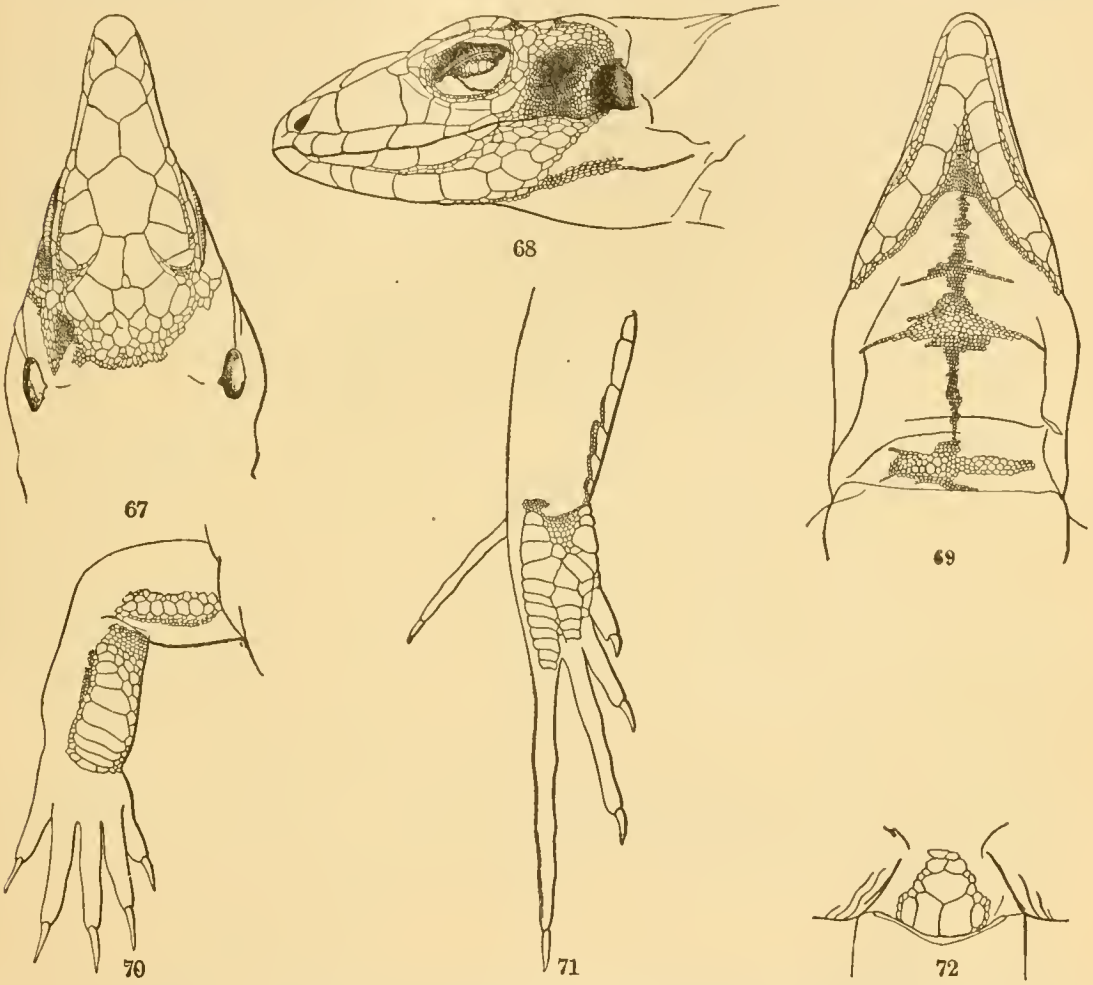
It seems as if in *A. exul* the inner row of enlarged tibials averages somewhat larger. In some of the Mona specimens this row is very

[a] White-spotted.

slightly differentiated at the lower end, but the difference between the two forms is neither constant nor well marked, and is at best an average one.

The same remark holds good with regard to the preanal plates. In all our specimens of *A. alboguttata* a smaller but well differentiated plate is located on either side of the two posterior plates and a similar one in front of the anterior plate, but this arrangement is also frequent in *A. exul*, though not nearly universal.

There is an average difference between the two forms in the width of the plates on the upper arm. In *A. exul* they are considerably



FIGS. 67–72.—AMEIVA ALBOGUTTATA. 1½ × natural size. 67, top of head; 68, side of head; 69, underside of head; 70, dorsal view of fore leg; 71, dorsal view of hind foot; 72, preanal plates. No. 29368, U.S.N.M.

wider as a rule, especially the upper ones, while in *A. alboguttata* they are usually comparatively narrower, with a tendency to decrease in size gradually at the upper end, but intermediate and identical specimens are not uncommon; thus in No. 29372, from Mona, and in 27146, from Arecibo, Porto Rico, the relative size of the plates as well as their relationship to the ones on the lower arm are exactly alike.

As to any distinction derived from the entire separation of the plates on the upper arm from those on the lower arm, or their more or less apparent continuation, there is absolutely no difference in the two

forms. The plates are definitely separated in the specimens from St. Thomas, Porto Rico, and Mona.

Neither can I discover any difference in the situation of the nostril with reference to the two nasal plates between which it is located.

The difference in the number of femoral pores is a real one, although it is only shown in the average and the figures intergrade considerably; in fact the range of individual variation in *A. exul* covers the extremes of *A. alboguttata*. Thus in sixty-seven specimens of *A. exul* from Porto Rico and St. Thomas the number of femoral pores varies between 12 and 18. Of these sixty-seven specimens, 64 per cent have 15 and 16 pores, while 12 per cent have 14 and other 12 per cent have 17 pores. In sixteen specimens of *A. alboguttata* the number of pores varies between 12 and 15. Of these sixteen specimens, more than 81 per cent, have 12 and 14 pores. The exact averages are, for *A. exul* 15.4, and for *A. alboguttata* 13.3. Curiously enough there seems to be an aversion for the number 13, as only one specimen in sixty-seven of the former and one in sixteen of the latter have 13 pores. Although the series of *A. alboguttata* is comparatively insignificant, it seems safe to conclude that the great majority of this form have 12 to 14 femoral pores, while most *A. exul* have 15 to 16.

From the tables published by Mr. Meerwarth,[a] one might be led to suppose that there is a fairly constant difference between the two forms, consisting in the greater number of labials in *A. exul*, as the average number of supralabials is 6.6 and of infralabials 6.1 in the latter against supralabials 6.0 and infralabials 5.1 in *A. alboguttata*. This result, which is entirely at variance with what I have obtained, is probably due to his scantier material. At first I suspected that the discrepancy might be due to a real difference between the St. Thomas specimens and those from Mona, and that the Porto Rican specimens, of which he had none, might be intermediate. I consequently arranged my series from the three islands separately, with the following result:

Locality.	Supra-labials.	Infra-labials.
St. Thomas, 10 specimens	6.1	5.2
Porto Rico, 48 specimens	6.1	5.1
Mona, 7 specimens	6.05	5.1

It will be seen (1) that my Mona specimens agree with Meerwarth's from the same island; (2) that my St. Thomas and Porto Rican specimens average nearly the same, and (3) that they also average the same as the Mona Island specimens. It seems therefore pretty safe to conclude that there is no difference in this respect between the two forms.

[a] Mitth. Naturh. Mus. Hamburg, XVIII, 1901, pp. 30–33.

Dimensions.

The largest specimen in our museum (No. 29374) measures as follows:

	mm.
Total length (tail reproduced)	260
Snout to vent	95
Tail (reproduced)	165
Snout to ear	23
Width of head	16
Fore leg from axilla	32
Hind leg from groin	62
Outer toe without claw	8.5
Inner toe without claw	4.5

The specimen described by Boulenger measured from snout to vent 122 mm., and was consequently a much larger animal. It seems doubtful, however, if *A. alboguttata* reaches the same extreme size as *A. exul*.

Habitat.—This form, as far as known, is restricted to the small island of Mona.

List of specimens of Ameiva alboguttata.

U. S. N. M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
29368	Half gr.	Mona Island, Porto Rico	Aug. 8, 1901	B. S. Bowdish	Specimen figured.
29369	do	do	do	do	
29370	do	do	do	do	
29371	do	do	do	do	
29372	do	do	Aug. 9, 1901	do	
29373	do	do	Aug. 10, 1901	do	
29374	do	do	Aug. 18, 1901	do	Specimen measured, p. 621.

Genus CELESTUS[a] Gray.

1838. *Celestus* Gray, Ann. Nat. Hist., II, Dec., 1838, p. 288 (type *C. striatus*).

1845. *Oneyda* Gray, Cat. Liz. Brit. Mus., p. 119 (type *O. owenii*).

1860. *Siderolamprus* Cope, Proc. Phila. Acad., 1860, p. 368 (type *S. enneagrammus*).

1861. *Panolopus* Cope, Proc. Phila. Acad., 1861, p. 494 (type *P. costatus*).

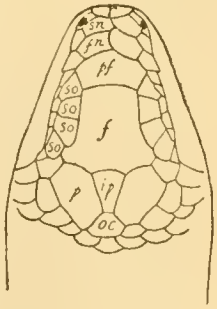


Fig. 73.—Shields on top of head of Celestus. *f*, frontal; *fn*, frontonasal; *ip*, interparietal; *oc*, occipital; *p*, parietal; *pf*, prefrontal; *r*, rostral; *sn*, supranasal; *so*, supraoculars.

In spite of the great external resemblance to the skinks as exemplified by the Mabuya, described above, the lizards forming this genus belong to a totally different family, the *Anguidæ*, of which our "glass snake" is perhaps the best known example. They are with equal propriety called "slippery backs," being smooth and glossy, and this name might appropriately

[a] According to Agassiz *Celestus* is a name of some person. It is quite as likely, however, that it is a nonsense word coined by Gray.

be retained for these and allied species, the Mabuyas, then, to be known by the latter name or that of skinks.

This genus is confined to the Greater Antilles and Central America, no species occurring in the Caribbean islands. Only a single one is known from Porto Rico.

CELESTUS PLEII[a] (Duméril and Bibron).

1839. *Diploglossus pleii* Duméril and Bibron, Erpét. Gén., V, p. 605 (type locality erroneously given as Martinique; type in Mus. Paris; Plée coll.).—Duméril, Cat. Méth. Rept. Mus. Paris, I, 1851, p. 154.—Boulenger, Cat. Liz. Brit. Mus., II, 1885, p. 294 (part).—*Celestus p.* Cope, Proc. Phila. Acad., 1868, p. 124.—*D.* (*Celestus*) *p.* Bocourt, Miss. Sci. Mex., Zool., Rept., livr. 6, 1879, p. 381, pl. xxii, figs. 4–4*b* (type).

1868. *Celestus degener* Cope, Proc. Phila. Acad., 1868, p. 124 (type locality, Porto Rico).

1876. *Diploglossus plei* Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 708 (Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 811 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, p. 69 (Porto Rico).

The type of *Celestus pleii* collected by Plée and now in the Paris Museum is said to be from Martinique. Taking into consideration that it remains unique and that the genus is entirely foreign to the fauna of the Lesser Antilles, there can be no doubt that the locality is erroneous, like that of the majority of reptiles reported as having been collected in Martinique by Plée.

The next question is to decide to which of the known species the name *C. pleii* should be applied. Bocourt[b] has given a very fine figure of the unique type, which has every appearance of being accurate. It shows a *Celestus* very close to our Porto Rican specimens, Cope's *C. degener*. The only differences I can discover consist in the latter having the second upper labial higher and broadly in contact with the postnasal and an apparently larger nostril. The postocular and temporal scales are also different, being of about equal size in the figure, while in our Porto Rican specimens the postorbital series consist of quite small scales followed by a series of three very large temporal plates. It is very doubtful whether any stress should be laid on these apparent differences, which, after all, may be due to inexactness of the draftsman or engraver. The division of the prefrontal in the type of *C. pleii* as shown in Bocourt's figure is probably only an individual aberration, a similar case being also recorded in one of the Jamaican species.

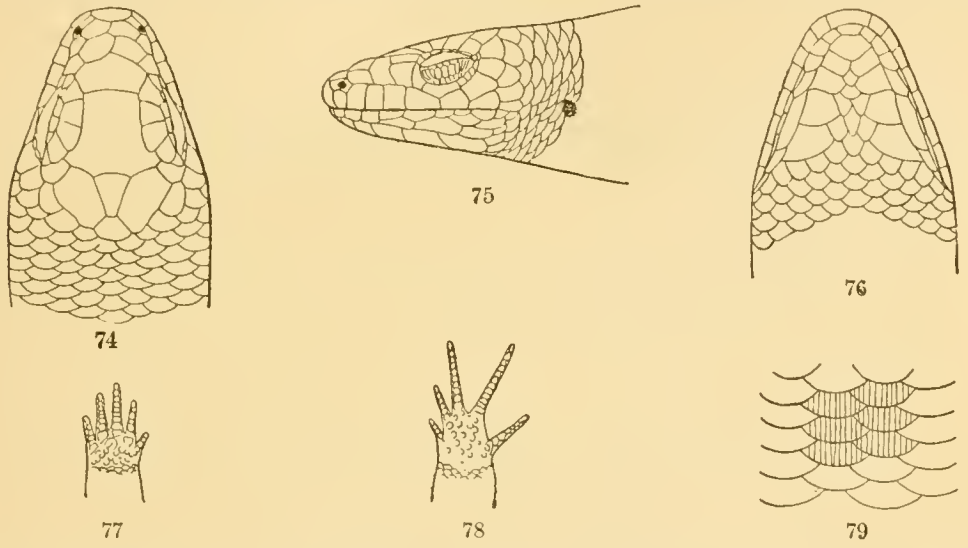
Knowing as we now do that Plée sent Porto Rican fishes to the Paris Museum, probably collected by himself on that island while en route to Martinique, we have every reason to believe that a number of his reptiles were obtained there also, the present species among them, and

[a] To Mr. Plée, a French traveler, who collected the type specimen.

[b] Miss. Sci. Mex. Zool., Rept., pl. xxii, fig. 4.

that having been shipped from Martinique the person in charge of the reptile collection at the Paris Museum recorded them as having been collected in the latter island.

Description.—U.S.N.M. No. 27066; Catalina plantation, northeastern Porto Rico, about 890 feet altitude; March 1, 1900. Rostral squarish, much wider than high, followed by a pair of supranasals broadly in contact; a pair of fronto-nasals larger than the supranasals; prefrontal undivided, much broader than long, with a projecting angle in front and a straight border behind, the latter forming a suture with the entire anterior border of the frontal; frontal large, longer than the width between the supraoculars, but not as long as its extreme width at the posterior border, in contact with four supraoculars; no fronto-parietals; parietals large, about the size of the prefrontal, separated from the supraoculars by a smaller shield and from each other



FIGS. 74–79.—CELESTUS PLEII. 74, top of head; 75, side of head; 76, underside of head; 77, underside of right fore foot; 78, underside of left hind foot. 2 × natural size. 79, scales on back, showing arrangement and striation. 4 × natural size. No. 27066, U.S.N.M.

by a nearly triangular interparietal and a shorter occipital, the two latter shields forming a short suture; five supraoculars; a single nasal in contact with rostral, the nostril being pierced in the posterior half; three loreals in a row between nasal and preocular, first in contact with supranasal and fronto-nasal, second in contact with fronto-nasal and prefrontal and third loreal in contact with a small shield interpolated between it and the anterior supraocular and prefrontal; a long angular subocular wedged in between fifth and sixth supralabials; eight supralabials; three large temporals in the first row, forming a semicircle behind the eye; mental small, much narrower than rostral, followed by an unpaired larger postmental; four pairs of chin-shields, the first two in contact with infralabials; ear opening roundish, small, about the size of the first supralabial; body elongate, the distance between the tips of the adpressed fore and hind limbs being greater than the distance from tip of snout to arm; thirty-four scales round

the body, dorsals and laterals finely striated, not keeled, the average number of striæ on the back being eleven; preanal scales somewhat enlarged; fore legs shorter than distance from tip of snout to ear opening; five fingers, short, third longest, inner one very short; hind legs short; five short toes, fourth longest, first very short; tail cylindric, ending in a point, longer than head and body, covered with scales like those of the body, the two median rows underneath very slightly larger than the others.

Color above (living and in alcohol) walnut brown, with numerous more or less interrupted and anastomosing dusky cross bands which do not reach the lateral longitudinal band. The latter is of a dark brownish gray with a sharply defined crenelated upper edge, gradually fading into the pale color of the underside which is clay colored washed with orange; lower lips and throat spotted with dark brownish gray.

Dimensions.

	mm.
Tip of snout to tip of tail	172
Tip of snout to vent	81
Vent to tip of tail	91
Tip of snout to ear	12
Width of head	10
Tip of snout to fore leg	24
Distance between tips of adpressed limbs	28
Fore leg	11
Hind leg	16

Our largest specimen (No. 25528) is somewhat larger, measuring 101 mm. from snout to vent, but the tail is broken.

Variation.—Our four specimens are essentially alike, and the species does not seem to be subject to great variation. In the type the prefrontal seems to be divided, and in our number 25634 only three chinshields are present on the right side. The number of scales round the body varies between 34 and 38, two having 36. A rather young individual (No. 25634) differs chiefly in the head being proportionately larger, snout to ear measuring 8 mm. and snout to vent 40 mm.

Habitat.—So far as known this species is confined to Porto Rico proper, where it seems to be rare. The four specimens in our collection are the only ones apparently of which the exact locality is known. They were all taken in the coffee belt.

Habits.—Nothing is known of its habits. The one I collected I picked up from under a flat stone. Its movements were slow, and when grabbed by the tail it wriggled itself loose from this member without much effort.

List of specimens of Celestus pleii.

U.S. N. M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
26498	Adult ..	Lares	Jan. 26, 1899	A. B. Baker	
25528	....do...	Adjuntas	Feb. 3, 1899	.....do	
25634	Young..	Lares	Jan. 26, 1899	.....do	Description, p. 624.
27066	Adult ..	Catalina plantation (890 feet altitude).	Mar. 1, 1900	L. Stejneger	Specimen described and figured, p. 623.

Genus ANOLIS[a] Daudin.

1803. *Anolis* Daudin, Hist. Nat. Rept., III, p. 50 (type *A. bullaris*).
1817. *Anolius* Cuvier, Régne Anim., 1st ed., II, p. 41 (emend.).
1826. *Xiphosurus* Fitzinger, Neue Class. Rept., p. 17 (type *A. cuvieri*).
1830. *Dactyloa* Wagler, Nat. Syst. Amph., p. 148 (substitute name).
1836. *Acantholis* Cocteau, Compt. Rend. Acad. Paris, III, 1836, p. 226 (type *A. loysiana*).
1843. *Semiurus* Fitzinger, Syst. Rept., p. 64 (type *Anolis cuvieri*).
1843. *Eupristis* Fitzinger, Syst. Rept., p. 64 (type *Anolis equestris*).
1843. *Microctenus* Fitzinger, Syst. Rept., p. 64 (type *Anolis edwardsii=A. garmani*).
1843. *Ctenonotus* Fitzinger, Syst. Rept., p. 64 (type *Anolis bimaculatus*).
1843. *Istiocercus* Fitzinger, Syst. Rept., p. 65 (type *A. cristatellus*).
1843. *Ptychonotus* Fitzinger, Syst. Rept., p. 65 (type *A. fasciatus*).
1843. *Trachycoelia* Fitzinger, Syst. Rept., p. 66 (type *A. lineatus*).
1843. *Ctenodeira* Fitzinger, Syst. Rept., p. 66 (type *A. richardii*).
1843. *Eudactylus* Fitzinger, Syst. Rept., p. 67 (type *A. goudotii*).
1843. *Heterolepis* Fitzinger, Syst. Rept., p. 67 (type *A. pulchella*).
1843. *Trachypilus* Fitzinger, Syst. Rept., p. 67 (type *A. sagraei*).
1843. *Ctenocercus* Fitzinger, Syst. Rept., p. 68 (type *A. carolinensis*).
1843. *Heteroderma* Fitzinger, Syst. Rept., p. 68 (type *A. loysiana*).

The great facility with which many species of this genus are able to change their colors has earned for them the name American Chameleons, and the larger species are also usually known by the name "cameleon" in the Greater Antilles, the smaller ones being called "lagarto." The generic term *Anolis*, which is supposed to be of West Indian origin, might very appropriately be adopted also as the vernacular name.

The faculty of changing color is quite astonishing in some of the species. Thus the brilliantly emerald green *Anolis evermanni* turns in an instant to a dingy wax-yellow with various dusky markings. Under certain conditions *A. gundlachi* and *A. cristatellus* may appear entirely sooty black, and while in affect *A. krugi* may lose its very conspicuous longitudinally striped pattern and become a semitranslucent olive. The brilliant color of the gular sack, or dewlap, of the males does not seem to be subject to this changeability.

[a] *Anolis*, native name of several species in the Antilles.

The Porto Rican species of *Anolis* are easily identified when alive or recently killed, their colors being in most cases quite characteristic.

Thus the large *A. cuvieri* is not only easily recognized by its size and the peculiar flat, bony surface of the head as well as the separation of the dorsal scales by granules, but also by its more or less greenish coloration.

A. evermanni is also green, but it is a small species and the terminal third of the tail is black.

A. stratulus is more or less drab, brownish, or grayish, mostly with a double series of blackish spots along the middle of the back, and the dewlap, or pendant throat fan of the male, is deep orange.

A. cristatellus and *A. gundlachi* are also more or less brownish or grayish, though while alive many specimens, especially of the latter, are nearly black, but the dewlap is more or less tinged with olive or greenish in addition to the orange. *A. gundlachi* is, moreover, easily characterized by the metallic blue color of the "white" of its eyes, and by the oblique series of bead-like yellowish spots on the flanks.

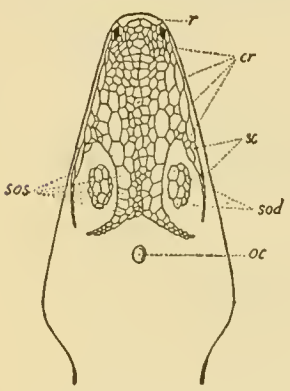


FIG. 80.—SCUTELLATION OF TOP OF HEAD OF ANOLIS. *cr*, canthus rostralis; *oc*, occipital; *r*, rostral; *sc*, superciliaries; *sod*, supraocular disk; *sos*, supraorbital semicircle.

The three species *A. pulchellus*, *krugi*, and *poncensis* form a small group by themselves, characterized by the coloration, which is disposed in longitudinal stripes. Of these *A. poncensis* is at once distinguished by the lack of a distinctive color to the dewlap, which is entirely covered by the scales. In both *A. pulchellus* and *krugi* the dewlap is naked with distant scales, red in the former and yellow in the latter, as described in detail under the respective species.

With female specimens, as well as those preserved in alcohol, recourse must be had to the structural characters as contrasted in the "key." It is not always, however, that a single character is sufficient. Sometimes a criterion based on the presence or absence of a scale fails, mostly only on one side of the specimen, so that it is always advisable to examine both sides. Moreover, a specimen should always be compared with the detailed description to see if it agrees in the majority of characters.

KEY TO THE SPECIES OF ANOLIS RECORDED FROM PORTO RICO.

a^1 Dorsal scales entirely separated from each other by several circles of granules (fig. 84) ..... *A. cuvieri*, p. 627.

a^2 Dorsal scales juxtaposed or imbricated.

b^1 Dorsal scales (all, or with the exception of two rows on the median line) granular or tubercular, differing but little, if at all, from laterals, but very much from the much larger ventrals, which are smooth or feebly keeled.

c^1 Two, or more, shields or scales between the superciliaries and the supraocular semicircle bordering the supraocular granules anteriorly.

d^1 Supraocular semicircles separated by at least two scale rows; occipital shield separated from supraocular semicircles by at least five scale rows (fig. 89) ..... *A. gundlachi*, p. 633.

d^2 Supraocular semicircles in contact or with at most a single series of scales between; occipital shield separated from supraocular semicircles by at most four scale rows.

e^1 Occipital shield separated from supraocular semicircles by two or three scale rows (rarely four) (figs. 92, 95) ..... *A. cristatellus*, p. 638.

e^2 Occipital shield separated from supraocular semicircles by one scale row (rarely two) (fig. 98) ..... *A. monensis*, p. 646.

c^2 One shield between the superciliaries and the supraocular semicircle bordering the supraocular granules anteriorly.

d^1 Width of head as great, or greater than distance from tip of snout to center of eye; anterior femoral scales keeled, gradually diminishing; color greenish ..... *A. evermanni*, p. 647.

d^2 Width of head less than distance from tip of snout to center of eye; anterior femoral scales smooth, abruptly larger than the others; color brownish or grayish ..... *A. stratulus*, p. 651.

b^2 Dorsal scales large, flat, keeled, imbricate, very much like the ventrals, which are very strongly keeled, the keels forming continuous ridges.

c^1 Lateral scales granular (fig. 108).

d^1 Width of head much more than half the distance from tip of snout to ear-opening; four to six median dorsal scale rows more or less abruptly larger than the others (fig. 108); skin of dewlap in male, orange ..... *A. krugi*, p. 655.

d^2 Width of head about one-half the distance from tip of snout to ear-opening; dorsal scales gradually increasing in size from the laterals toward the median rows (fig. 112); skin of dewlap in male, crimson. *A. pulchellus*, p. 660.

c^2 Lateral scales imbricated, keeled (fig. 117) ..... *A. poncensis*, p. 665.

ANOLIS CUVIERI[a] Merrem.

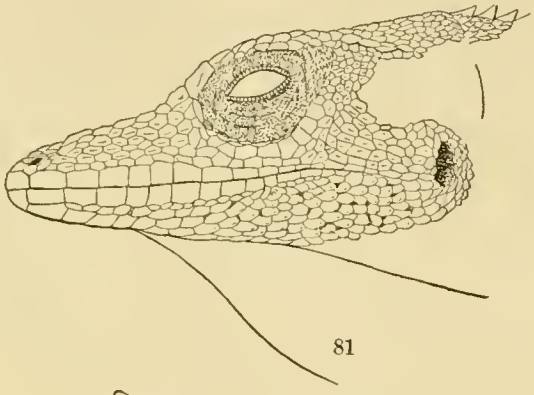
1820. *Anolis cuvieri* Merrem, Syst. Amph., p. 45 (type locality, erroneously, Jamaica).—Boulenger, Cat. Liz. Brit. Mus., II, 1885, p. 23.—Garman, Bull. Essex Inst., XIX, 1887, p. 27 (Porto Rico).

1829. *Anolius velifer* Cuvier, Règne Anim., 2 ed., II, p. 29, pl. v, fig. 1.—Guérin, Icon. Règne Anim., Rept., 1830, pl. xii, fig. 1.—*Anolis v.* Duméril and Bibron, Erpét. Gén., IV, 1837, p. 164.—Duméril, Cat. Méth. Rept. Mus. Paris, I, 1851, p. 59.—Reinhardt and Luetken, Vid. Meddel. Naturh. Foren., (Copenhagen) 1862 (1863), p. 260; author's separate, p. 108 (Vieques, Tortola, St. John??).—Cope, Proc. Phila. Acad., 1868, p. 312 (Porto Rico).—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 705 (Anebradillas, Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 308 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 69, 159 (Porto Rico).—*Xiphosurus v.* Cope, Proc. Phila. Acad., 1861, p. 208 (Vieques).

The early technical history of this species is somewhat obscure. Cuvier briefly mentioned it under a French name in the first edition of his Règne Animal (1817), saying that it is from "Jamaica, and probably the other Antilles." A somewhat crude figure is added, and from the statement that he had "found berries in its stomach" it is plain

[a] To the great French zoologist G. Cuvier, because of his having indicated the species in the first edition of Règne Animal, 1817.

that he had a specimen. On these meager data Merrem established the systematic name *Anolis cuvieri*, but Cuvier himself subsequently, in the second edition of his famous work, repudiated this name, substituting that of *Anolius velifer*. He added nothing to the original account, only eliminated the word "*probably*" in front of "the other Antilles," and reproduced the old figure. The following year, however, Guérin published another figure, without a description, under the latter name. Seven years later Duméril and Bibron give a very elaborate description, under the name of *Anolis velifer*, of the only specimen in the museum at Paris, the origin of which they were ignorant of, but suspected to be from the Antilles. No mention is made of it being the type of the species, or of Jamaica being its hab-



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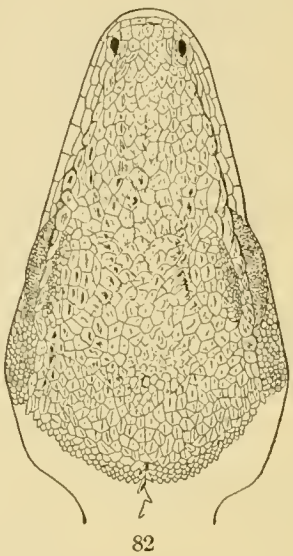

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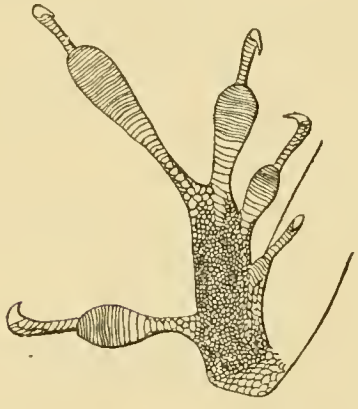

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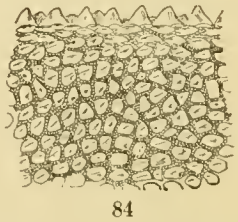

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FIGS. 81–84.—ANOLIS CUVIERI. 81, side of head; 82, top of head; 83, under side of hind foot. Nat. size. 84, skin on side of neck, and dorsal crest. 2 × natural size. No. 26999, U.S.N.M.

itat, as alleged by Cuvier. Neither is there any mention in Duméril's Catalogue (1851) of the reptiles in the Paris museum of this specimen being Cuvier's type, notwithstanding the statement on page ii of the introduction that "all these types [those of Cuvier and others], so precious to the naturalist, who should always take them as standards of comparison, have consequently been exactly recorded in all cases in which they have been found." Nevertheless, the probability is that they had before them Cuvier's original specimen.

We next hear of the species in 1861, when Cope reported the habitat to be Vieques, and in 1863, when Reinhardt and Luetken identified specimens from Vieques and Tortola with Duméril and Bibron's description. Afterwards specimens from Porto Rico were similarly identified

by Cope, Peters, and Garman. When Boulenger published the second volume of his catalogue of lizards the British Museum did not possess any specimens of this species, and his description is apparently only a condensation of that of Duméril and Bibron. It is consequently to be noted that no direct comparison of Porto Rican specimens has hitherto been made with the type specimen without locality in Paris.

Detailed as Duméril and Bibron's description is, it is not sufficiently so for proving whether their specimen really is the Porto Rican form and not the same as *A. ricordii*, from Santo Domingo. So much is certain, that the characters which they rely upon for distinguishing the two species do not hold in any one particular. As a matter of fact, the two descriptions both fit Santo Domingo specimens, some agreeing with that of *A. velifer*, some with *A. ricordii*. It may even be stated that the character assigned to the former as particularly dis-

FIGS. 85–86.—ANOLIS RICORDII. Santo Domingo. 85, side of head; 86, top of head. Natural size. No. 12108, U.S.N.M.

tinctive, namely, the greater flatness of the scales on top of the snout, is more characteristic of the Santo Domingo specimens than those from Porto Rico. Another distinction derived from the descriptions of Duméril and of Boulenger (namely, the scaling of the gular pouch, that of *A. ricordii* being entirely covered with granules, while that of *A. velifer* (=*cuvieri*) is said to be "nearly naked, with only a few lines of small ovalo-rhomboid, feebly keeled scales on each side" does not hold either, as it is only a sexual difference, the former being that of the female, the latter that of the male. Nevertheless, the two species differ quite sufficiently to establish their claims to separate specific recognition.

The differences between *A. cuvieri*, from Porto Rico, and *A. ricordii*, from Santo Domingo, though slight, are both constant and easily applied. The scales on top of the head seem to be smaller in the for-

mer. Thus, whenever the individual scales can be made out, I find a series of scales between the two rows which form the frontal ridges, while in *A. ricordii* the scales of the two ridges join along their whole length. In the former the scales which surround the occipital cavity on the sides and behind are flatter, more polygonal, and distinctly keeled, while in *A. ricordii* I find them to be undifferentiated, rounded, and tubercular, like the others. In *A. cuvieri* the scales covering the loreal triangle are somewhat larger, especially the lower row, and all the scales on the sides of the head are rougher, while in *A. ricordii* they are fairly smooth. The scales on the sides of the tail are smaller in *A. ricordii* than in *A. cuvieri*. At the level of the fifth "ray" there are about 10–14 longitudinal rows and 3–4 vertical rows between the rays, while in *A. ricordii* we find about 16–20 longitudinal rows and 5–6 vertical rows between the rays. In the latter the scales are also more regularly squarish, forming more regular vertical rows. There may be other minor differences, but the above appear sufficient for distinguishing the two species with comparative ease.

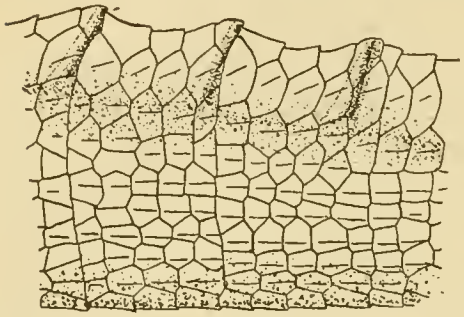


FIG. 87.—ANOLIS CUVIERI. Side of tail at level of fifth spine. 2 × natural size. No. 26843, U.S.N.M.

Any possible uncertainty as to the exact applicability of the name *A. cuvieri* to the Porto Rican species is now set at rest, thanks to the kindness of Prof. Leon Vaillant and his assistant, Dr. Mocquard, at the Museum d'Histoire Naturelle in Paris. In order to satisfy myself on this question, I sent them copies of figs. 87 and 88, representing the pholidosis of the tail of both species. After a careful comparison with the types, Dr. Mocquard wrote, under date of February 21, 1901:

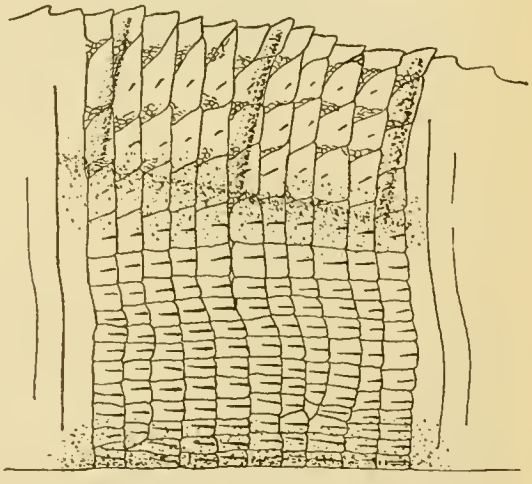


FIG. 88.—ANOLIS RICORDII. Santo Domingo. Side of tail at level of fifth spine. 2 × natural size. No. 12108, U.S.N.M.

The type specimen of *Anolis velifer* Cuv. (=*An. cuvieri* Merrem) agrees exactly in the pholidosis of the tail with the drawing of No. 26843 [fig. 87]. Between the fourth and fifth or fifth and sixth spines of the caudal crest the scales form three or four vertical rows and two longitudinal rows. On the lateral aspect of the tail, as also indicated on the drawing, they are disposed in verticils, in each of which there may be counted ten more or less irregular longitudinal rows of scales. The vertical rows do not appear quite as regular as the longitudinal series. On the other hand, the drawing of No. 12108 [fig. 88] corresponds to the pholidosis of the tail of *Anolis ricordii* D. B. (Erpét. gén., t. IV, p. 167).

Description.—Adult male. Mus. Comp. Zool. Cambr., Mass., No. 6167; Porto Rico; Dr. Stahl, collector. Top of head flat, with only shallow depressions on prefrontal and occipital region, the scales being rather small and roughly keeled and tuberculated, even those on top of the snout, but especially those of the supraorbital semicircle and frontal ridges; about nine enlarged supraoculars, flat, keeled, and in contact with the semicirculars; supraorbital semicircles separated by about three scale rows from each other and from the occipital, which is barely noticeable; scales surrounding the occipital depression on the sides and behind rather large, flat, polygonous, each with a strong keel; six loreal rows, the scales composing the lower row next to the supralabials largest; one row of large keeled suboculars; 7–8 supralabials to under the center of the eye; temporals flat, with a low tubercle, all the scales of the sides of the head being more or less rugose or wrinkled; ear-opening rather small, upright, oval; back and sides covered with uniform scales tuberculated or keeled, separated from each other by one or more rings of minute granules; on the median line of the neck and back a series of about fifty triangular spines forming a saw-tooth ridge scarcely connected with the caudal crest; ventral scales about same size as dorsals, though more closely set, but not keeled or distinctly tuberculated except on the flanks; scales on chin and throat more elongate, distinctly keeled or tuberculated; scales on upper side of fore limbs larger than dorsals, juxtaposed or imbricate, keeled, becoming larger and multicarinate toward the hand; scales on upper side of hind limb similar, though less sharply keeled; scales on under side of femur slightly larger than ventrals, indistinctly tuberculate; digital expansion well developed, about thirty-three lamellæ under second and third phalanges of the fourth toe; tail strongly compressed, basal half with a high fin-like crest supported by about fourteen bony "rays," the elongations of the neural spines of the caudal vertebræ; scales covering sides of tail flat, keeled, those on the fin between the "rays" elongate, three to four rows between rays, about fourteen longitudinal rows on side of tail at the level of the fifth ray from the base; gular appendage very large, with distant rows of small tuberculate scales on the naked skin, the edge being rounded, thickened, and scaly; large postanal plates.

Dimensions.	*mm.*
Total length	402
Snout to anus	126
Anus to end of tail	276
Snout to ear-opening	42
Greatest width of head	24
Fore limbs	59
Hind limbs	96
Tibia	34

The *adult female* differs chiefly in having no fin to the tail, a smaller dewlap with the scales set more closely and uniformly, and in lacking the enlarged postanal plates. The upper edge of the tail is even, the ridge on the posterior two-thirds consisting of a series of rather flat more or less regularly hexagonal scales of nearly equal size surmounted by a keel, but slightly higher than those on the lateral scales.

It is a curious fact that the *young* of this species is unknown. Moreover, nobody seems to have described the young of the corresponding species, equally large and peculiar Anolis, which inhabits the islands of Haiti, Cuba, and Jamaica. As we know the adults of the other species, it is not possible that any of these can be the young of these giants, nor do any of them present structural characters which would strengthen a suspicion in this direction. The large species do not seem to be common on any of the islands, but that fact hardly explains why no young ones or even half-grown specimens have thus far been observed.

Colors of living animal.—Adult male; U.S.N.M. No. 26843; L. Stejneger, No. 9021; Catalina plantation, about 890 feet altitude; February 21, 1900. Iris hazel, with a bright brassy ring bordering the pupil; general color above greenish gray; back clouded with brownish and sides with blackish dots, the dusky of the back and the black spots on the sides arranged in four perceptible, though indistinct, cross-bands; eyelids blackish, with a citron-yellowish spot above and behind the eye and a smaller one in front; under the eye a long semilunar white spot barely invading the posterior supralabials; several whitish spots on temples and sides of neck; underside white with dark-gray mottlings and spots; dewlap delicately Naples-yellow, scales on the edge white; legs indistinctly crossbarred with dusky bands more or less spotted with blackish. Tongue pale cadmium orange, whole interior of mouth of same color, but duller.

During my absence three specimens, all males, were brought alive to Dr. Richmond while in Luquillo, two of which (Nos. 26999 and 27000) were colored like the above, while the third (No. 27001) was uniform emerald green when alive. In alcohol it is colored like the others.

Habitat.—This giant Anolis seems to be confined to Porto Rico, Vieques, and Tortola, but is absent on St. Thomas and probably also on St. John. In Haiti it is replaced by a nearly allied species, *A. ricordii*.

In Porto Rico it occurs at least as high up as 900 feet above the sea. It is rather rare, since none of the Fish Commission parties obtained it. This scarcity can hardly be attributed to the mongoose, as it seems to live in tall trees rather than on the ground. As already stated, young and half-grown specimens are as yet unknown. Besides the specimens from the localities mentioned in the list below I have examined two specimens in the Hamburg museum, collected by Mr. J. Michaelis at Arecibo in 1900.

List of specimens of Anolis cuvieri.

U.S.N.M. No.	M.C.Z. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
12448	.....	Male adult...	Porto Rico	.....	[Latimer?]	
12449	.....	.....do	.....do.....	.....	.....do	
12449	.....	.....do	.....do.....	.....	.....do	
12503	.....	Female adult	.....do.....	.....	.....do	
26843	.....	Male adult ..	Catalina plantation, Porto Rico.	Feb. 21, 1900..	L. Stejneger.....	Northeast side of El Yunque, 890 feet altitude. Description, p. 632.
26999	.....	.... do	Luquillo, Porto Rico	Mar. 7, 1900..	C. W. Richmond .	Description, p. 632.
27000	.....	.....do	.....do.....	.....do	.....do	
27001	.....	.....do	.....do.....	.....do	.....do	
27770	.....	Female adult	Humacao, Porto Rico.	Spring, 1900..	L. C. McCormick.	
29363	.....	.....do	Mayaguez, Porto Rico.	Oct. 16, 1901..	B. S. Bowdish....	
.....	6167	Male adult ..	Porto Rico	.....	Dr. Stahl	See Bull. Essex Inst., XIX, 1887, p. 27. Specimen described and figured, p. 631.

ANOLIS GUNDLACHI[a] Peters.

1876. *Anolis gundlachi* Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 705 (type locality, Utuado, Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 308 (Utuado, Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 69, 159 (Porto Rico).

1885. *Anolis gundlachii* Boulenger, Cat. Liz. Brit. Mus., II, p. 25 (Porto Rico).—Garman, Bull. Essex Inst., XIX, 1887, p. 27 (Porto Rico).

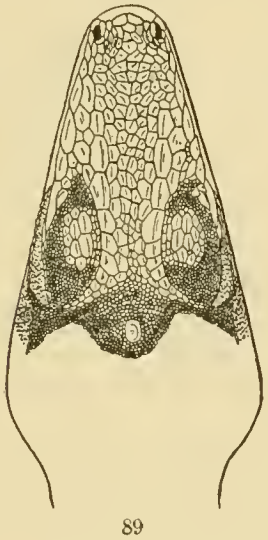
It will be noticed that the animal described and figured by me differs greatly from Peters's original description of *Anolis gundlachi*. The discrepancies are so many and so great that at first I felt quite confident of having a new species. My doubts were dispelled, however, when I took my specimens over to Berlin and compared them directly with Peters's types, with which they are identical.

The present species in many respects resembles *A. cristatellus*, which also has a caudal fin and a brownish ground color. It is easily told apart, however, by the more numerous scale rows between the supraorbital semicircles and between the latter and the occipital.

Description.—Adult male. U.S.N.M. No. 26903; near top of El Yunque Mountain, 2,863 feet altitude, February 25, 1900. Head with two slightly diverging frontal ridges; forehead hollow; all the head scales keeled or wrinkled; rostral very low, narrower than the mentals; about eight scales in a series between the nostrils, those nearest the latter distinctly elongated; three to four series of scales separating

[a] To Dr. Johan Gundlach, the distinguished Cuban naturalist. Born in Marburg, Germany, July 17, 1810; arrived in Cuba in January, 1840; died in Havana, March 14, 1896.

the supraocular semicircles, the lateral ones larger than the median series; occipital, much smaller than the ear opening, separated from the supraocular semicircles by eight or nine rows of scales, which are but slightly larger than the median dorsal granules; supraorbital disk consisting of about ten enlarged, polygonal, keeled scales in three rows surrounded by granules; three or four scales between the superciliaries and the supraocular semicircle bordering the supraocular granules anteriorly; canthus rostralis sharp, consisting of four or five elongated shields and continuous with the superciliaries which extend backward to the supraocular semicircle, though diminishing greatly in size posteriorly; loreal rows, seven or eight; subocular semicircle in contact with supralabials; supralabials 8, the suture between sixth and seventh under the center of the eye; temporals numerous, granular, with a bare indication of an enlarged supratemporal line; dorsal and lateral scales



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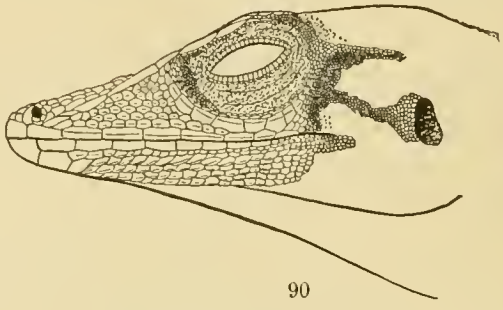

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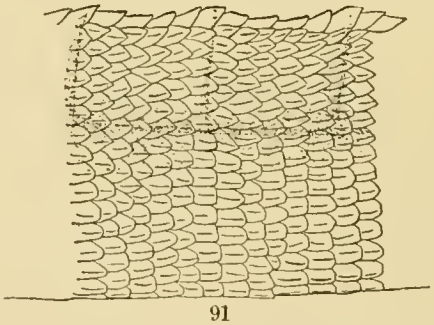

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FIGS. 89–91.—ANOLIS GUNDLACHI. 89, top of head; 90, side of head. 2 × natural size. 91, side of tail at level of fifth spine. 4 × natural size. No. 26903, U.S.N.M.

very small, almost granular, sharply keeled, a few rows along the median line slightly enlarged; ventral scales much larger, imbricate, keeled, those of the throat smaller, more enlongated, also keeled; fore legs above with imbricate, sharply keeled scales about the size of the ventrals; femur and tibia similarly covered; the underside of the femur with minute scales, about the size of the smaller dorsals and distinctly keeled; fingers and toes above sharply multicarinate; digital expansion narrow, about seventeen lamellæ under phalanges ii and iii of fourth toe; tail long, compressed, the basal half above with a fin supported by about sixteen bony rays; the fin being about as high as the muscular portion; the upper edge of the fin with a series of slightly enlarged scales, the one capping the ray still larger, thus forming a slightly serrated undulating crest; no regular verticils, but the rays set off sections of about six scale rows, the corresponding number of scales on the

upper edge being five; dewlap moderate with distant series of keeled scales, anterior edge thickened; postanal shields slightly developed.

When in affect the skin on the median line of the neck and back is raised up so as to from a high crest of rounded outline and deeply notched over the shoulder much after the fashion of *Anolis krugi*, as shown in the frontispiece.

Dimensions.

	mm.
Total length	200
Tip of snout to vent	68
Vent to tip of tail	132
Tip of snout to ear	20
Width of head	12
Fore leg	35
Hind leg	58

The *female* differs chiefly in the absence of dewlap, fin to the tail, and postanal plates. The tail is nearly cylindric, the median series of scales above being only slightly enlarged and forming a scarcely appreciable serration. The full-grown female appears to be considerably smaller than the male, one (No. 27270) distended with large eggs measuring only 42 mm. from snout to vent. One of the eggs measures 11 by 5 mm.

Variation.—The greatest variation is found in the size of the occipital and the scales which separate the latter from the supraocular semicircle, the number of rows sometimes being as low as five. These scales are always small, almost granular, and their increased number appears to be at the expense of the occipital, which is sometimes quite small and difficult to distinguish. In exceptional cases the median row of small scales between the larger ones separating the supraocular semirings is absent, in which case there are only two rows. The number of polygonal scales composing the supraocular disk is also very variable, there being often as many as 17 or 18. In some specimens, especially younger ones, the ventrals are less sharply keeled than in others.

Color of living specimens.—Adult male; No. 26903, U.S.N.M. (L. S. No. 9031); Camp El Yunque, 2,863 feet altitude; February 25, 1900. General color dark olive above, with five wide lateral nearly black cross bands, which barely meet on the median line, while on the sides they are very close together, being only separated by an oblique series of small yellowish spots; a wide postocular blackish-brown band passes above the ear and joins its fellow of the other side on the back of the neck; top of head densely marbled with indistinct spots of brown edged with dusky; edge of eyelids, semicircular line formed by the keels of the suboculars, as well as alternating spots on the supralabial sutures lemon-yellow; underside dull olive-yellow, chin bright lemon-yellow, the entire under surface densely marbled with blackish; underside of limbs similar, but paler; limbs above crossbarred olive and blackish, like back; tail similarly crossbarred, but

slightly browner in the basal half or a little beyond the compressed elevated portion, followed by a median uniform blackish portion and a terminal part which is uniform pale brownish olive; feet nearly uniform dusky; dewlap very large, with thickened edge, the color of the skin being a dull orange-olive, the distant scales straw yellow; iris blackish brown; tongue plumbeous.

No. 26900, *adult male*, same locality, February 26, very similar, but the crossbars less well defined on the flanks.

Another *adult male* (No. 26901), same locality and date, on the other hand, was more deeply colored, the oblique strings of yellowish beads across the velvety black sides being very conspicuous. Eye deep *indigo blue*.

No. 26902, also an *adult male* caught at the same place and time, was nearly uniform olive brown when captured, but the pattern came out gradually and the body color became lighter while being held alive in the hand; feet above black; chin back to the beginning of the dewlap bright orange yellow, the dark marblings on the yellow being Indian red. A pretty high cervico-nuchal fold of rounded outline.

A *young specimen*, No. 26904, same locality and date as No. 26903, resembled the latter closely, though lateral crossbars and oblique bands of yellow spots were obsolete; a pale vertebral band extends from occiput to some distance on the tail, the black dorsal crossbars being hourglass shaped; dewlap present, but small.

Another *young specimen* (No. 26905) was uniformly velvety blackish brown above.

Numerous specimens collected at Adjuntas (1,450 feet altitude) during the second week of April agree in color with those from El Yunque, including the yellow chin, though they did not seem to be as dark and velvety, the greater richness of the color in the latter locality being probably due to the greater humidity. The narrow bands of pale bead-like spots on the flanks, the yellow spot on the chin, and the dark metallic blue of the "white" of the eyes may be regarded as absolutely characteristic of this species.

Habitat.—This species seems to be confined to the coffee belt and the high mountain tops above it. In the western portion of the island it probably goes farther down than at the eastern end, where we found none at the Catalina coffee plantation, about 900 feet altitude, though it is to be noted that the United States Fish Commission party obtained a single specimen (No. 25723) on the slope of El Yunque, somewhere between 600 and 900 feet above the sea. At Utuado, in the west, it occurs, though apparently rare and not at the level of the town. There is no record of the exact altitude at which the types were collected, and the single specimen obtained by me during a diligent search for nearly a week (No. 27180) was taken in a side valley at least 100 feet higher than the town, consequently over 500 feet above sea level. At Adjuntas it was common in the coffee planta-

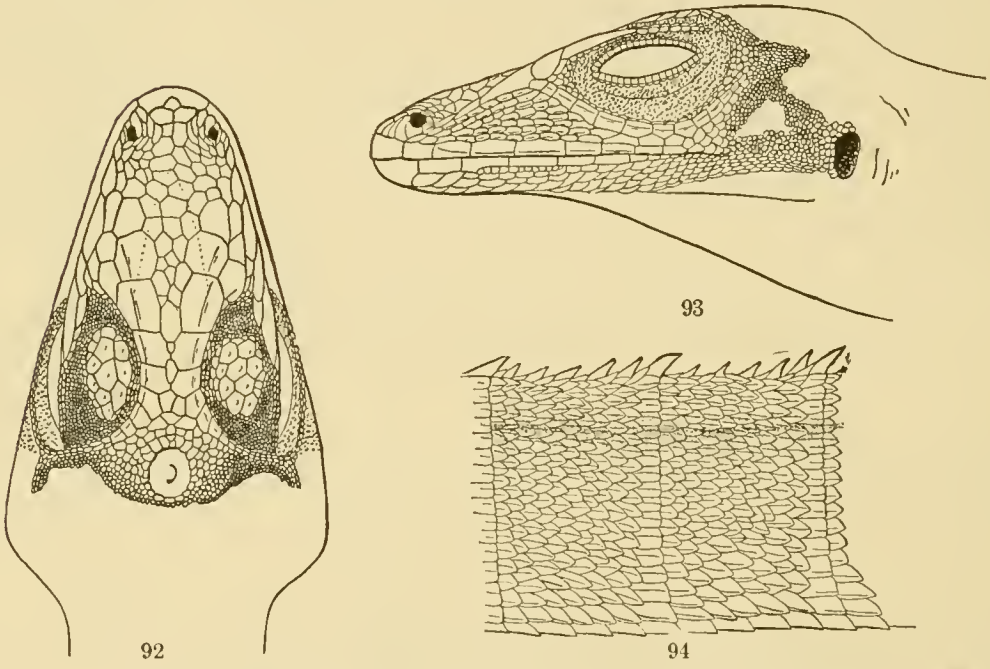
tions, and near the top of El Yunque Mountain it was almost equally common in the original forest.

List of specimens of Anolis gundlachi.

U. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
25451	Male adult.	Adjuntas, Porto Rico	Jan. 30, 1899	A. B. Baker	
25723	Young	El Yunque, Porto Rico	Feb. 19, 1899	U. S. Fish Commission.	
26900	Male adult.	Camp El Yunque, Porto Rico.	Feb. 26, 1900	L. Stejneger	El Yunque Mountain, near top, altitude 2,978 feet.
26901	do	do	do	do	El Yunque Mountain, near top, altitude 2,978 feet. Description, p. 636.
26902	do	do	do	do	El Yunque Mountain, near top, altitude 2,978 feet. Description, p. 636.
26903	do	do	Feb. 25, 1900	do	El Yunque Mountain, near top, altitude 2,978 feet. Description, pp. 633, 635.
26904	Young	do	do	do	El Yunque Mountain, near top, altitude 2,978 feet. Description, p. 636.
26905	do	do	Feb. 26, 1900	do	El Yunque Mountain, near top, altitude 2,978 feet. Description, p. 636.
27180	do	Utuado, Porto Rico	Apr. 7, 1900	do	Topotype.
27243	do	Adjuntas, Porto Rico	Apr. 13, 1900	do	
27244	Male adult.	do	do	do	
27245	Half gr	do	do	do	
27246	do	do	do	do	
27247	Male adult.	do	do	do	
27248	do	do	do	do	
27249	do	do	do	do	
27255	do	do	do	do	
27257	Fem. adult	do	Apr. 12, 1900	do	
27260	Male adult.	do	Apr. 14, 1900	C. W. Richmond	
27261	do	do	do	do	
27262	do	do	do	do	
27265	do	do	Apr. 12, 1900	do	
27266	Fem. adult	do	do	do	
27267	Half gr	do	do	do	
27268	do	do	do	do	
27269	do	do	do	do	
27270	Fem. adult	do	do	do	Description, p. 635.
27271	Young	do	do	do	
27272	do	do	do	do	

ANOLIS CRISTATELLUS[a] Duméril and Bibron.

837. *Anolis cristatellus* Duméril and Bibron, Erpét. Gén., IV, p. 143 (type locality, Martinique).—Duméril, Cat. Méth. Rept. Paris, I, 1851, p. 58 (St. John, Marie-Galante, Guadeloupe).—Reinhardt and Luetken, Vid. Meddel. Naturh. Foren., (Copenhagen) 1862 (1863) (p. 249), author's separate, p. 97 (St. Thomas, St. Croix, St. John, Just v. Dyck, Vieques, Water Island, Tortola, Porto Rico).—Bocourt, Miss. Sci. Mex., Zool. Rept., livr. 2, 1873, pl. xiv, p. 12 (Martinique).—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 706 (Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 309 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 69, 159 (Porto Rico).—Boulenger, Cat. Liz. Brit. Mus., II, 1885, p. 26 (St. Thomas, Dominica, Martinique).—Garman, Bull. Essex Inst., XIX, 1887, p. 27 (Haiti, St. Thomas, Bayamon, Porto Rico, Morant I.).—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 21 (St. Thomas, S. Domingo, Porto Rico).—*Xiphosurus c.* Cope, Proc. Phila. Acad., 1861. p. 208 (St. Thomas).



Figs. 92–94.—Anolis cristatellus. 92, top of head; 93, side of head. $2\frac{2}{3}\times$ natural size. 94, side of tail at level of fifth spine. $5\frac{1}{3}\times$ natural size. No. 26803, U.S.N.M.

Description.—Adult male, U.S.N.M. No. 26803; Pueblo Viejo, near San Juan, February 14, 1900. Top of head with two diverging frontal ridges, which, with two similar, but reversed and lower, prefrontal ridges, inclose a lozenge-shaped frontal hollow; head scales nearly flat, except those forming the supraocular disk, which are keeled or, rather, tuberculated; rostral low, narrower than the mentals, six or eight scales in a series between the nostrils; supraocular semicircles in contact with two small scales between them at the intersection of the sutures; occipital as large as the ear-opening, separated from the supraocular semicircles by three rows of scales, which are flat and

[a] Having a little crest; from *crista*, crest, *cristatus*, crested.

many times larger than the largest dorsal granules; supraorbital disk consisting of about ten enlarged, polygonal keeled scales surrounded by several rows of granules; two small and one large scale between the superciliaries and the supraocular semicircle bordering the supraocular granules anteriorly; canthus rostralis sharp, consisting of five elongated shields, the second one from the superciliary ridge being particularly large; superciliary ridge consists of one very long and narrow anterior shield followed by a double series of smaller scales which separates the supraocular granules above from those covering the lateral orbital region; loreal rows six, with raised lower edges; subocular semicircle keeled, separated from supralabials by one row of scales; supralabials nine, the suture between seventh and eighth being under the center of the eye; temporals granular, with a bare indication of an enlarged supratemporal line; dorsals minutely granular, the granules being pointed or keeled, with a bare indication of a median double series of slightly larger ones; ventral scales large, imbricate, rounded behind and flat or slightly convex, those on the throat smaller, more elongate and more strongly convex; fore legs above with sharply keeled scales, those on the upper arm smaller, those on the lower arm larger than the ventrals; anterior face of femur and underside of tibia similarly covered, the scales on the former gradually decreasing on the underside, the upper side of both being covered with granules like those on the back; scales on fingers and toes sharply carinate; digital expansion wide, about 20 lamellæ under phalanges ii and iii of fourth toe; tail moderate, compressed, the basal half above with a fin supported by about 14 bony rays; caudal verticels distinctly indicated by a vertical series of more enlarged scales, those between being pointed and smaller, in about nine vertical, somewhat irregular series, all imbricate and keeled; the scales covering the upper edge of the tail raised and spinous, forming a serrated ridge the teeth of which increase in length toward the posterior end of each verticel, about six spines corresponding to each verticel in the basal portion; dewlap large, with distant series of scales, the anterior edge thickened; postanal scales slightly developed.

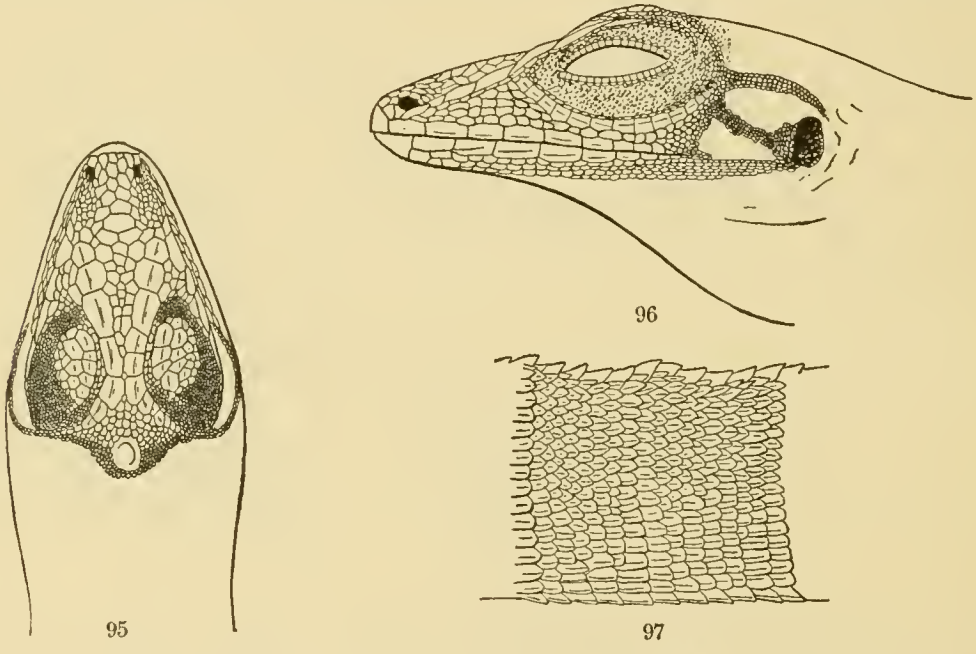
The dermal folds on upper neck and back are present, the former quite prominent, the latter perhaps less so than in *Anolis gundlachi*.

Dimensions.

	mm.
Total length	145
Tip of snout to vent	60
Vent to tip of tail	85
Tip of snout to ear	17
Width of head	12
Fore leg	26
Hind leg	47

The *female* and *young* differ chiefly in the absence of dewlap and fin to the tail, the female also by entire absence of postanal plates.

Variation.—The greatest variation is found in the head scales, the most important being in the relation of the supraorbital semicircles to each other and to the occipital plate. In the majority of cases the semicircles are broadly in contact across the interorbital space, but a small scale is often developed at the intersection of the sutures in this region, and it is very rare that not at least one pair of semicirculars touch. The number of scale rows separating the occipital varies between 2 and 4, the latter number but rarely, however. The enlargement of the two median rows of scales or granules on the back is variable, forming an appreciably raised line in many individuals, but almost absent in others. The height of the caudal fin is also somewhat variable, as it is not always the highest in the largest males,



FIGS. 95–97.—ANOLIS CRISTATELLUS. Culebra Island. 95, top of head; 96, side head. $2\frac{2}{3}$ × natural size. 97, side of tail at level of fifth verticil. $5\frac{1}{3}$ × natural size. No. 25777, U.S.N.M.

but I believe it to be present in all full-grown males and do not at all understand the remark by Reinhardt and Luetken to the effect that the caudal crest is absent in specimens from Porto Rico and Vieques. In some specimens the ventral scales are more or less distinctly keeled.

One of the individuals, a halfgrown male (No. 25777), from the island of Culebra, collected by the *Fishhawk* party, differs at first sight so much from the other specimens of the same locality collected by Mr. Baker that at one time I believed it to belong to a different species. The scales separating the occipital and supraocular semicircles, as well as the enlarged scales forming the supraocular disk, are rather numerous, but these peculiarities are matched by various Porto Rican species, and a careful comparison of other points fail to discover any tangible differences. It is very light colored, with scarcely any dark mark-

ings, but with a pale band along the middle of the back. It is figured (figs. 95–97).

Colors of living animal.—Adult male, U.S.N.M. No. 26803 (L. S. No. 9011); Pueblo Viejo, near San Juan, February 14, 1901. Iris dark brown; edge of eyelids light yellowish; general color above bronzy greenish gray; head and several faint longitudinal irregular spots on the sides of the back more brownish; on each side of the median dorsal line between the insertion of the hind legs a better defined and larger spot of irregular outline, pale brownish edged with brownish black and a light line outside the dark margin; on the middle line of the tail a series of dusky spots located at the base of the largest spines; throat whitish; rest of underside suffused with greenish yellow, most intensely in the preanal region; dewlap greenish yellow verging into brownish orange toward the edge.

A *younger male* (No. 26805, same locality and date) was similar but darker, and with no definite markings of brown; tail cross-banded, light and dusky; dewlap fairly well developed.

An *adult female* (No. 26804, same locality and date) resembled the male, only browner, especially the supraorbital disk, which was almost ferruginous; median dorsal line paler grayish with a dusky shade on each side; throat whitish with gray marblings; abdomen greenish yellow; no dewlap.

The coloration of the living specimens not only varies greatly individually, but to some extent also locally. Thus, as a rule, the specimens which we saw in Utuado were much more distinctly marked, the dark dorsal cross bands standing out in much greater contrast than in other localities. On the other hand, those collected in the white limestone hills east of Ponce were nearly uniformly drab without distinct markings. The specimens obtained in Vieques had the dewlap more brightly colored, thus in No. 27068 (L. S. No. 9053) it was green very broadly margined with brownish orange in strong contrast.

Habitat.—Anolis cristatellus occurs not only in Porto Rico, Culebra, and Vieques; but also on all the Virgin Islands, specimens having been recorded by Reinhardt and Luetken from St. Thomas, St. John, Just van Dyck, Water Island, and St. Croix. On Mona it is represented by a nearly allied form.

In Porto Rico it is probably the commonest species, being found everywhere in the lowlands and in certain localities at least as high up on the mountain sides as 1,440 feet. The highest point where I met with this species was at Adjuntas, in which locality, however, *Anolis gundlachi* was the commoner species. The few specimens of *A. cristatellus* seen there were found on rocks near the river and in the town itself, but not in the woods and coffee plantations.

List of specimens of Anolis cristatellus.

U.S. N.M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
25452	Half gr.	Adjuntas, Porto Rico	Jan. 30, 1889	A. B. Baker	
25453	do	do	do	do	
25464	Male ad.	San Juan, Porto Rico	Jan. 6, 1899	do	
25465	do	Añasco, Porto Rico	Jan. 21, 1899	do	
25466	do	do	do	do	
25467	Fem. ad.	do	do	do	
25468	do	do	do	do	Trifurcate tail.
25469	Male ad.	Rio Piedras, Porto Rico	Jan. 8, 1899	do	
25470	Fem. ad.	do	do	do	
25471	Male ad.	do	do	do	
25472	Fem. ad.	do	do	do	
25473	Young	do	do	do	
25474	do	do	do	do	
25475	do	do	do	do	
25476	do	do	do	do	
25477	Male ad.	do	do	do	
25478	Young	do	do	do	
25479	do	do	do	do	
25480	do	do	do	do	
25481	do	do	do	do	
25490	do	Añasco, Porto Rico	Jan. 21, 1899	do	
25491	do	do	do	do	
25492	Half gr.	San Juan, Porto Rico	Jan. 6, 1899	do	
25493	Male ad.	Rio Piedras, Porto Rico	Jan. 8, 1899	do	
25494	do	do	do	do	
25495	do	do	do	do	
25496	Half gr.	San Juan, Porto Rico	Jan. 6, 1899	do	
25497	Male ad.	do	do	do	
25499	Fem. ad.	do	do	do	
25500	Young	do	do	do	
25508	Half gr.	Utuado, Porto Rico	Jan. 27, 1899	do	
25509	Young	do	do	do	
25510	do	do	do	do	
25511		do	do	do	
25520	Young	San Juan, Porto Rico	Jan. 6, 1899	do	
25524	Half gr.	Cayey, Porto Rico	Feb. 3, 1899	do	
25525	do	do	do	do	
25526	Young	do	do	do	
25530	do	Arroyo, Porto Rico	Feb. 2, 1899	do	
25531	do	do	do	do	
25534	Male ad.	do	do	do	
25535	do	do	do	do	
25536	Half gr.	do	do	do	
25542	Male ad.	Lares, Porto Rico	Jan. 25, 1899	do	
25543	do	do	do	do	
25544	Half gr.	do	do	do	
25558	Male ad.	Culebra Island	Feb. 10, 1899	do	
25559	Young	do	do	do	
25560	do	do	do	do	
25561	do	do	do	do	
25562	do	do	do	do	
25563	do	do	do	do	
25586	Male ad.	Arroyo, Porto Rico	Feb. 4, 1899	do	
25587	do	do	do	do	
25588	do	do	do	do	

List of specimens of Anolis cristatellus—Continued.

U. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
25589	Male ad.	Arroyo, Porto Rico	Feb. 4, 1899	A. B. Baker	
25590	... do ...	.....do	.....do	.....do	
25591	....do ...	.....do	.....do	.....do	
25600	....do ...	Adjuntas, Porto Rico	Jan. 29, 1899	.....do	
25601	Fem. ad.	.....do	.....do	.....do	
25602	....do ...	.....do	.....do	.....do	
25603	Young ..	.....do	.....do	.....do	
25609	Male ad.	Ponce, Porto Rico	Jan. 31, 1899	.....do	
25610	....do ...	.....do	.....do	.....do	
25611	....do ...	.....do	.....do	.....do	
25612	....do ...	.....do	.....do	.....do	
25613	....do ...	.....do	.....do	.....do	
25614	....do ...	.....do	.....do	.....do	
25615	....do ...	.....do	.....do	.....do	
25617	Fem. ad.	Aguas Buenas, Porto Rico	Jan. 12, 1899	.....do	
25618	Young ..	.....do	.....do	.....do	
25619	....do ...	.....do	.....do	.....do	
25671	Male ad.	Caguas, Porto Rico	Jan. 9, 1899	U. S. F. C. Fishhawk	
25672	.... do ...	.....do	.....do	.....do	
25673	....do ...	.....do	.....do	.....do	
25674	....do ...	.....do	.....do	.....do	
25675	Fem. ad.	.....do	.....do	.....do	
25676	....do ...	.....do	.....do	.....do	
25677	Male ad.	.....do	.....do	.....do	
25678	....do ...	.....do	.....do	.....do	
25679	....do ...	.....do	.....do	.....do	
25680	....do ...	.....do	.....do	.....do	
25681	....do ...	.....do	.....do	.....do	
25682	....do ...	.....do	.....do	.....do	
25683	....do ...	.....do	.....do	.....do	
25684	....do ...	.....do	.....do	.....do	
25685	....do ...	.....do	.....do	.....do	
25686	....do ...	.....do	.....do	.....do	
25687	....do ...	.....do	.....do	.....do	
25688	....do ...	.....do	.....do	.....do	
25689	Fem. ad.	.....do	.....do	.....do	
25690	....do ...	.....do	.....do	.....do	
25691	Young ..	.....do	.....do	.....do	
25692	....do ...	.....do	.....do	.....do	
25693	....do ...	.....do	.....do	.....do	
25694	....do ...	.....do	.....do	.....do	
25695	....do ...	.....do	.....do	.....do	
25696	....do ...	.....do	.....do	.....do	
25697	....do ...	.....do	.....do	.....do	
25705	.....	.....do	.....do	.....do	
25707	Young ..	.....do	.....do	.....do	
25708	Male ad.	.....do	Jan. 8, 1899	.....do	
25709	....do ...	.....do	.....do	.....do	
25710	....do ...	.....do	.....do	.....do	
25711	Young ..	.....do	.....do	.....do	
25712	....do ...	.....do	.....do	.....do	
25713	....do ...	.....do	.....do	.....do	
25718	....do ...	San Juan, Porto Rico	Jan. 6, 1899	.....do	
25719	Fem. ad.	.....do	Jan. 7, 1899	.....do	
25760	Male ad.	.....do	Jan. 2, 1899	.....do	

List of specimens of Anolis cristatellus—Continued.

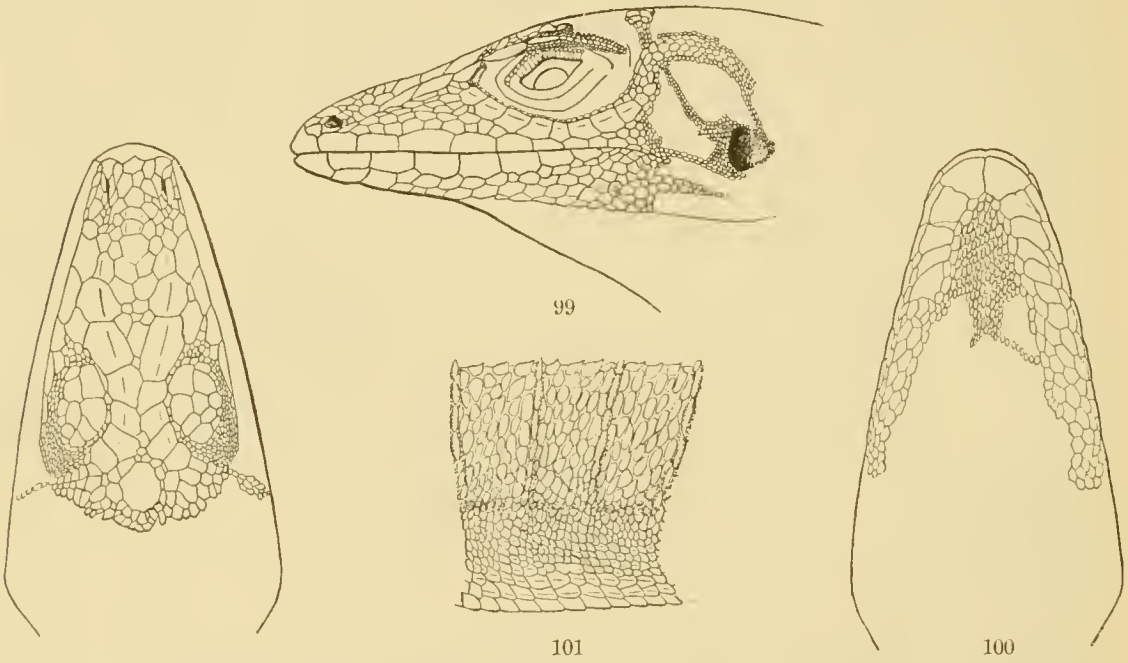
U.S. N.M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
25761	Halfgr..	San Juan, Porto Rico.....	Jan. 2,1899	U.S.F.C.Fishhawk	
25762	Young..	.....do	.....do	.....do	
25763	....do ...	.....do	.....do	.....do	
25764	Male ad.	.....do	Jan. 3,1899	.....do	
25765	....do ...	.....do	.....do	.....do	
25766	Young..	.....do	.....do	.....do	
25767	....do ...	.....do	.....do	.....do	
25768	....do ...	.....do	.....do	.....do	
25769	....do ...	.....do	.....do	.....do	
25771	....do ...	Bayamon, Porto Rico	Jan. 5,1899	.....do	
25777	Halfgr..	Culebra Island, San Ildefonso.	Feb. 9,1899	.....do	Figs. 95–97, p. 640.
26087	....do ...	Hucares, Porto Rico.....	Feb. 14,1899	.....do	
26088	....do ...	.....do	.....do	.....do	
26089	Male ad.	.....do	Feb. 15,1899	.....do	
26093	....do ...	Culebra Island, Porto Rico...	Feb. 10,1899	.....do	
26094	Fem. ad.	.....do	.....do	.....do	
26095	Male ad.	.....do	.....do	.....do	
26096	....do ...	.....do	.....do	.....do	
26097	....do ...	.....do	.....do	.....do	
26098	....do ...	.....do	.....do	.....do	
26099	....do ...	.....do	.....do	.....do	
26100	Halfgr..	.....do	.....do	.....do	
26795	Male ad.	San Juan, Porto Rico.....	Feb. 12,1899	C. W. Richmond..	
26796	Fem. ad.	.....do	.....do.....	L. Stejneger.....	
26797	Young..	.....do	.....do	.....do	
26798	Fem. ad.	.....do	.....do	.....do	
26799	.....	San Antonio, Porto Rico	.....do	.....do	
26803	Male ...	Pueblo Viejo, Porto Rico.....	Feb. 14,1900	.....do	Description and fig. pp. 638, 641.
26804	Female.	.....do	.....do	.....do	Description, p. 641.
26805	Male ...	.....do	.....do	.....do	Description, p. 641.
26806	Young..	.....do	.....do	.....do	
26815	Male ad.	.....do	Feb. 17,1900	.....do	
26816	Young..	.....do	.....do	.....do	
26811	Male ad.	Mameyes, Porto Rico.....	Feb. 20,1900	.....do	
26812	Young..	.....do	.....do	.....do	
26844	Male ad.	Catalina Plantation, Porto Rico.	Mar. 1,1900	.....do	
26845	....do ...	.....do	.....do	.....do	
26846	Young..	.....do	.....do	.....do	
26847	Male ad.	.....do	.....do	.....do	
26848	Young..	.....do	.....do	.....do	
26856	Male ad.	.....do	Feb. 22,1900	.....do	
26857	....do ...	.....do	.....do	.....do	
26858	....do ...	.....do	.....do	.....do	
26859	Young..	.....do	.....do	.....do	
26870	Male ad.	.....do	Mar. 2,1900	.....do	
26871	Young..	.....do	.....do	.....do	
26872	....do ...	.....do	.....do	.....do	
26896	Male ad.	Between Catalina Plantation and Mameyes, Porto Rico.	Mar. 5,1900	.....do	
26897	Fem. ad.	.....do	.....do	.....do	
26983	Male ad.	Catalina Plantation, Porto Rico.	Feb. 21,1900	.....do	
26984	Fem. ad.	.....do	.....do	.....do	

List of specimens of Anolis cristatellus—Continued.

U. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
26985	Male ad.	Catalina Plantation, Porto Rico.	Feb. 21, 1900	L. Stejneger	
26986	Young	do	do	do	
26987	do	do	do	do	
26994	do	Between Mameyes and Luquillo, Porto Rico.	Mar. 5, 1900	do	
27067	Male ad.	Vieques Island, Porto Rico	Mar. 25, 1900	do	
27068	do	do	do	C. W. Richmond	Description, p. 641.
27164	do	Utuado, Porto Rico	Apr. 6, 1900	L. Stejneger	
27165	do	do	do	do	
27166	do	do	do	do	
27167	do	do	do	do	
27168	do	do	do	do	
27169	Young	do	do	do	
27170	do	do	do	do	
27171	do	do	do	do	
27172	do	do	do	do	
27173	do	do	do	do	
27174	do	do	do	do	
27175	Male ad.	do	Apr. 7, 1900	do	
27176	do	do	do	do	
27177	do	do	do	do	
27178	Young	do	do	do	
27179	do	do	do	do	
27184	do	do	do	do	
27185	Male ad.	do	Apr. 8, 1900	do	
27186	Fem. ad.	do	Apr. 9, 1900	do	
27187	Young	do	do	do	
27188	do	do	do	do	
27189	Half gr.	do	do	do	
27190	Young	do	do	do	
27191	do	do	do	do	
27192	do	do	do	do	
27205	Male ad.	do	Apr. 8–9, 1900	do	
27206	do	do	do	do	
27207	do	do	do	do	
27208	do	do	do	do	
27209	do	do	do	do	
27210	do	do	do	do	
27211	do	do	do	do	
27212	do	do	do	do	
27217	do	do	do	C. W. Richmond	
27218	Young	do	do	do	
27219	do	do	do	do	
27220	do	do	do	do	
27250	Half gr.	Adjuntas, Porto Rico	Apr. 13, 1900	L. Stejneger	
27251	Young	do	do	do	
27263	do	do	Apr. 14, 1900	C. W. Richmond	
27264	do	do	do	do	
27281	Fem. ad.	Ponce, Porto Rico	Apr. 16, 1900	L. Stejneger	
27296	Young	do	do	C. W. Richmond	
27297	do	do	do	do	
27318	Male ad.	Coamo, Porto Rico	Apr. 17, 1900	L. Stejneger	
27771	do	Humacao, Porto Rico	Spring, 1900	L. M. McCormick	
27772	do	do	do	do	

ANOLIS MONENSIS,[a] new species.

Diagnosis.—Dorsal scales small, juxtaposed, convex, gradually diminishing from the median line, becoming granular before reaching the sides; tail strongly compressed, in the adult male with a very high fin-like crest supported by rays, much less than twice the length of head and body; ventrals imbricate, smooth; occipital large, larger than ear opening, separated from the supraorbital semicircle by one row (exceptionally, two rows) of flat scales; semicirculars broadly in contact; tibia much shorter than head from tip of snout to ear-opening; two shields between supraocular semicircle and superciliaries bordering the supraocular granules anteriorly; anterior femoral scales keeled; color very pale gray, with a dusky, transocular line.



FIGS. 98–101.—ANOLIS MONENSIS. 2½ × natural size. 98, top of head; 99, side of head; 100, underside of head; 101, side of tail at level of fifth spine. No. 29387, U.S.N.M.

Type.—No. 29387, U.S.N.M. Mona Island, Porto Rico; collector, B. S. Bowdish.

Habitat.—Mona Island.

Anolis monensis is closely related to *A. cristatellus*, and is possibly directly descended from the latter. The scales are larger throughout, hence the fewer rows on the loreal triangle, the single row between occipital and supraorbital semicircle, the greater size of the dorsal scales or tubercles, etc. The caudal fin is excessively high, more so than in any *A. cristatellus*, or even *A. gundlachi*, examined by me. The coloration is also peculiar, being of a very pale gray, with a distinct transocular, dusky line. In many specimens there is a distinct white line from shoulder to groin. The color of the dewlap can not be made out in the alcoholic specimens, but there are indications that it is different from that of *A. cristatellus*.

[a] From Mona Island.

List of specimens of Anolis monensis.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
29375	Adult...	Mona Island, Porto Rico.....	Aug. 8, 1901	B.S. Bowdish.....	
29376	Young..	.....do.....	.....do.....	.....do.....	
29377	....do...	.... do.....	.....do.....	.....do.....	
29378	Adult...	.....do.....	.....do.....	.....do.....	
29379	....do...	.....do.....	.....do.....	.....do.....	
29380	....do...	.....do.....	.....do.....	.....do.....	
29381	....do...	.....do.....	Aug. 9, 1901	.....do.....	
29382	....do...	.....do.....	.....do.....	.....do.....	
29383	....do...	.....do.....	Aug. 11, 1901	.....do.....	
29384	....do...	.....do.....	.....do.....	.....do.....	
29385	....do...	.....do.....	.....do.....	.....do.....	
29386	....do...	.....do.....	Aug. 12, 1901	.....do.....	
29387	....do...	.....do.....	Aug. 19, 1901	.....do.....	Type.
29388	....do...	.....do.....	.....do.....	.....do.....	

ANOLIS EVERMANNI,[a] new species.

Diagnosis.—Dorsal scales granular or tuberculated, juxtaposed, slightly larger than the laterals, the median series not differentiated from the others, all much smaller than ventrals; tail slightly compressed, with an upper median series of enlarged keeled scales forming a serrated edge; digital expansion strongly developed; occipital shield nearly as large as the ear opening, separated from supraorbital semicircle by two or three scale rows; semicirculars in contact or separated by one row of scales; tibia less than length of head from tip of snout to ear opening, but more than two-thirds this distance; width of head as great or greater than distance from tip of snout to center of eye; granules on supraocular disk continuous with those on the eyelids across the posterior half of the superciliary ridge.

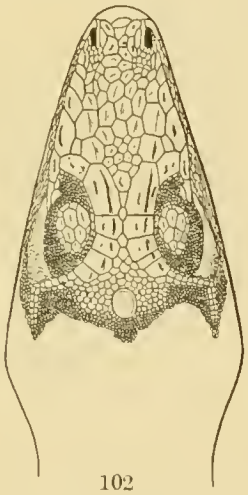
Type.—No. 26855, U.S.N.M. Catalina plantation, Porto Rico, 890 feet altitude; collector, L. Stejneger.

Habitat.—Porto Rico.

Description.—*Adult male*, U.S.N.M. No. 26855; Catalina plantation, about 890 feet altitude; February 21, 1900. Top of head with two diverging frontal ridges, disappearing before reaching the nostrils, and inclosing a frontal hollow; head scales keeled or wrinkled; rostral low, much narrower than the mentals; seven narrow scales in a row between the nostrils; one shield of each supraocular semicircle in contact, the others separated by one scale; occipital somewhat smaller than ear-opening, separated from the supraocular semicircles by three or four rows of scales; supraocular disk consisting of ten or twelve polygonal keeled shields, separated from the semicircle by one row

[a] Dedicated to Prof. B. W. Evermann, in charge of the U. S. Fish Commission expedition to Porto Rico.

of granules; one large shield in front of the supraocular granules between the superciliaries and the supraocular semicircle; canthus rostralis sharp, consisting of five elongated shields increasing gradually in size posteriorly, superciliary ridge consisting of one narrow elongated shield and one similar but very small one, but not followed by a differentiated series of small scales, the granules of the supraocular disk continuing uninterruptedly into the granules surrounding the eye; loreal rows five or six; subocular semicircle keeled, broadly in contact with the supralabials; supralabials nine, the suture between seventh and eighth being under the center of the eye; temporal granules about the size of dorsals, a well-marked double series of small scales forming the supratemporal line; dorsals coarse, keeled granules, without any median enlarged series, laterals smaller but similar; ventral scales rather small, slightly imbricate, rounded behind, flat, those on the throat granular; fore legs above with small keeled scales, about three



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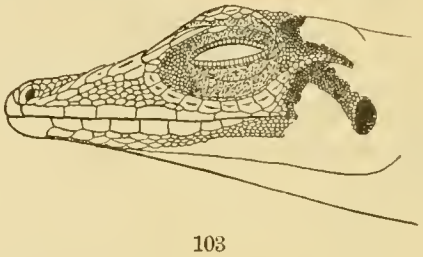
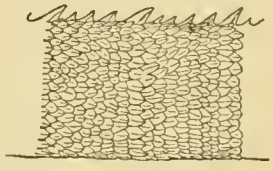


103



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FIGS. 102–104.—ANOLIS EVERMANNI. 102, top of head; 103, side of head. 2 × natural size. 104, side of tail at level of fifth verticil. 3 × natural size. No. 26866, U.S.N.M.

series on the anterior face of the lower arm being greatly enlarged, more than twice as large as the ventrals; anterior scales of femur enlarged, keeled, gradually diminishing posteriorly and below; scales covering hands and feet above multicarinate; digital expansion wide, about twenty-eight lamellæ under phalanges ii and iii of fourth toe; tail moderate, slightly compressed, with fairly well-marked verticils, every eighth or ninth vertical row being somewhat enlarged and surmounted by a strongly serrated edge of enlarged triangular spines, the fourth or fifth corresponding to the enlarged vertical scale row being larger than the others; dewlap naked, with distant series of scales, edge not thickened; postanal scales slightly developed.

The dermal folds on upper neck and back are very low, especially the latter, but there is a distinct depression between them on the shoulder region.

Dimensions.

	mm.
Total length	182
Tip of snout to vent	66
Vent to tip of tail	116
Tip of snout to ear	19.5
Tip of snout to center of eye	13
Width of head	13
Fore leg	30
Hind leg	45

Female and *young* differ in the absence of dewlap and cervico-dorsal folds, the former also of postanal plates; the tail is more cylindric and the spinous upper edge less pronounced.

Variation.—As usual great variation is found in the size and consequent number of the head scales. The supraorbital semicircles may be in contact, though I have never seen more than one shield on each side meeting, but just as often they are separated entirely by a single series of scales. The supraorbitals again are separated from the occipital usually by three, often by two, but very rarely by four scales. The loreal rows are mostly five, often four, more rarely six. There are usually six supralabials anterior to the center of the eye, sometimes only five, occasionally seven. The keeling and wrinkling of the upper head shields and scales are also subject to considerable variation, being usually less pronounced in youth.

Colors of living animal.—Adult male, U.S.N.M. No. 26866 (L. S. No. 9026). Catalina plantation, about 890 feet altitude; February 22, 1900. Iris, dark brown; eyelids, abruptly flesh-colored; general color, bright emerald green without markings; abdomen, underside of hind legs, and thick basal portion of tail below, pale glaucous green; terminal third of tail, black, tip, pale; dewlap, gamboge yellow; scales, pale yellow, no thickened edge.

When handled the animal changed from green to wax-yellow with numerous dusky spots and marblings on body and crossbars on tail, as well as longitudinal dusky stripes on throat; when reassuming its normal color the dusky markings disappeared before it turned green.

Another specimen (No. 26855, L. S. No. 9022), from same locality, I described as follows: General color, changing from bright parrot-green to almost dusky olive yellow, with faint indications of brownish, dusky marblings on back; terminal third of tail, blackish, extreme end pale; belly, underside of thighs, and thick part of tail, verging on pale glaucous green; throat and dewlap, wax-yellow; pinkish edges to the eyelids; iris, very dark brown with a dark steel-blue ring; inside of mouth, pale yellowish.

An *adult female* (No. 26867), same locality, is described in the notebook as like No. 26866, but with a very small dewlap not differentiated as to color. No soft cervico-nuchal or dorsal crests. The male has a

very low, curved nuchal flap and a still lower dorsal fold, with a distinct depression between them at the shoulders.

The *young*, as observed near Utuado, are pea-green with brownish spots arranged longitudinally with a pale stripe on flank from shoulder to groin, and one down the middle of the back, the latter interrupted by spots of dark brown; underside, whitish. When caught they change immediately to a more or less uniform brown.

Habitat.—Like *Anolis gundlachi*, the present species is peculiar to Porto Rico and has almost the identical vertical distribution. In the eastern part of the island we found it on the slopes of El Yunque from about 800 feet up nearly to the top, while in the west we traced it from above Utuado to Adjuntas. Near Utuado I saw it only in a deep wooded ravine facing north, in which the animals of the higher regions probably descend farther down than in the surrounding country and still more so than on the south slope of the mountain chain. Generally speaking, *Anolis evermanni* is confined to the coffee belt.

List of specimens of Anolis evermanni.

U. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
25454	Male adult	Adjuntas, Porto Rico	Jan. 30, 1899	A. B. Baker	
25455	do	do	do	do	
25456	Female adult.	do	do	do	
25458	do	do	do	do	
25459	Young	do	do	do	
25592	Male adult	do	Jan. 29, 1899	do	
25593	Female	do	do	do	
25594	do	do	do	do	
25595	do	do	do	do	
25596	Male adult	do	do	do	
25721	do	El Yunque, Porto Rico.	Feb. 19, 1899	U. S. F. C. Fish Hawk.	600 to 900 feet altitude.
25722	Half grown	do	do	do	
26085	Male adult	do	do	do	
26853	do	Catalina plantation, Porto Rico.	Mar. 1, 1900	L. Stejneger	
26854	Half grown	do	do	do	
26855	Male adult	do	Feb. 21, 1900	do	Type. Description, pp. 647, 649.
26861	do	do	Feb. 22, 1900	do	
26862	do	do	Feb. 21, 1900	C. W. Richmond	
26863	Female adult.	do	do	do	
26866	Male adult	do	Feb. 22, 1900	L. Stejneger	Figs. 102–104.
26867	Female adult.	do	do	do	Description, p. 649.
26868	Male adult	do	Mar. 2, 1900	do	
26869	Female adult.	do	do	do	
26899	Half grown	Between Catalina plantation and Mameyes, Porto Rico.	Mar. 5, 1900	do	
26906	Male adult	Camp El Yunque, Porto Rico.	Feb. 25, 1900	do	El Yunque Mountain, 2,978 feet altitude.

List of specimens of Anolis cvermanni—Continued.

U.S.N.M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
26907	Adult	Camp El Yunque, Porto Rico.	Feb. 27, 1900	L. Stejneger	El Yunque Mountain, 2,978 feet altitude.
27153	Male adult	Near Utuado, Porto Rico	Apr. 7, 1900	do	
27154	Female adult.	do	do	do	
27155	Young	do	do	do	
27156	do	do	do	do	
27213	do	do	Apr. 8–9, 1900	do	
27237	Male adult	Adjuntas, Porto Rico	Apr. 13, 1900	do	
27238	do	do	do	do	
27239	do	do	do	do	
27240	Female adult.	do	do	do	
27256	do	do	Apr. 12, 1900	do	
27259	do	do	do	do	
27273	do	do	Apr. 11-12, 1900	C. W. Richmond	Forked tail.
27274	do	do	do	do	
27278	Half grown	do	do	do	
27279	do	Pass between Adjuntas and Ponce, Porto Rico.	Apr. 15, 1900	do	

ANOLIS STRATULUS[a] Cope.

1861. *Anolis striatulus*[b] Cope, Proc. Phila. Acad., 1861, p. 209 (type locality, St. Thomas).—Garman, Bull. Essex Inst., XIX, 1887. p. 29, author's separate, p. 5 (Haiti, Porto Rico, St. Thomas.)

1863. *Anolis stratulus* Reinhardt and Luetken, Vid. Meddel. Naturh. Foren., (Copenhagen) 1862, p. 255, author's separate, p. 103 (St. Thomas, Vieques, Tortola, Just v. Dyck, Porto Rico).—Bocourt, Miss. Sci. Mex., Zool. Rept., livr. 2, pl. xiv, fig. 11 (1873) (St. Thomas).—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 706 (Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 310 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 69, 159 (Porto Rico).—Boulenger, Cat. Liz. Brit. Mus., II, 1885, p. 27.—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 22 (St. Thomas).

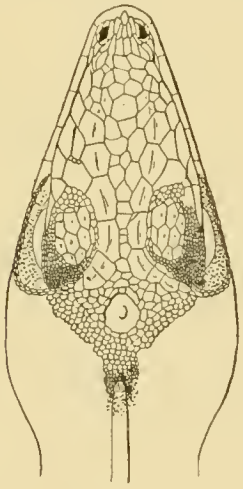
1863. *Anolis dorsomaculatus* Mus. Copenh. fide Reinhardt and Luetken, Vid. Meddel. Naturh. Foren., (Copenhagen), 1862, p. 255; author's separate, p. 103.

Description.—Adult male, U.S.N.M. No. 26865; Catalina plantation, about 890 feet altitude, February 22, 1900. Top of head with two curved frontal ridges which converge anteriorly and inclose a shallow frontal hollow; head scales flat, except those of supraocular disk; five elongated scales in a row between the nostrils; supraocular semicircles separated by one row of scales; occipital equaling ear opening, separated from the supraocular semicircle by two or three

[a] Diminutive of *stratus*, saddled.

[b] An obvious typographical error, as the word, in a footnote on the same page, is stated to be a diminutive of *stratus*.

rows of scales which are flat and as large as the ventrals; supraocular disk consisting of about ten polygonal keeled scales, separated from the semicircle by one row of smaller scales or granules; one large shield in front of the supraocular granules between the superciliaries and the supraocular semicircle; canthus rostralis consisting of five elongated scales gradually increasing in size posteriorly, the last two subequal; superciliary ridge consisting of one very long anterior shield followed by a very small one, the granules of the supraocular disk continuing behind the superciliaries into the granules surrounding the eye uninterrupted by any row of differentiated scales; loreal rows five; subocular semicircle strongly keeled, broadly in contact with supralabials; supralabials eight, suture between sixth and seventh being under the center of the eye; temporals granular in the center, bordered above by the curved supratemporal line of two rows of enlarged scales, being the posterior continuation of the subocular



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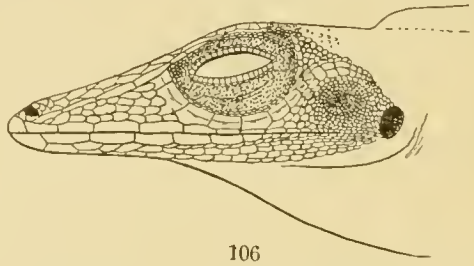

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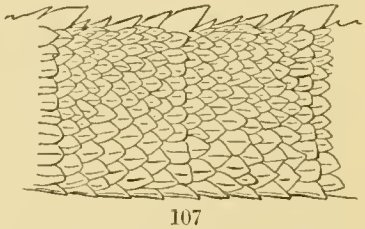

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FIGS. 105–107.—ANOLIS STRATULUS. 105, top of head; 106, side of head. $2\frac{2}{3}$ × natural size. 107, side of tail at level of fifth verticil. $5\frac{1}{2}$ × natural size. No. 26865, U.S.N.M.

semicircle; dorsals minutely granular, of same size as the laterals and with no median line of larger granules; ventral scales small, slightly imbricate, rounded behind, flat; those on the throat nearly granular, elongated, flat; fore legs above with small nearly smooth scales; scales on anterior aspect of femur enlarged, smooth, abruptly set off from the granules of the upper side; large scales covering the upper side of hand and feet feebly unicarinate; digital expansions large, about 19 lamellæ under phalanges ii and iii of fourth toe; tail moderately compressed with distinct verticils, with eight to nine vertical rows of feebly keeled scales between; upper edge strongly serrated, five spines to each verticil gradually increasing posteriorly, the last one surmounting the enlarged vertical row of the verticil being greatly enlarged; dewlap naked with series of distant scales, edge thickened; postanal plates well developed.

The dorsal folds, especially the one on the nape, very strongly developed.

Dimensions.

	mm.
Total length	125
Tip of snout to vent	44
Vent to tip of tail	81
Tip of snout to ear	13.5
Tip of snout to center of eye	9
Width of head	8
Fore leg	20
Hind leg	34

Female and *young* differ in the absence of dewlap and cervico-dorsal folds, the former also of postanal plates.

Variation.—The variation in the head scutellation is as great as in the allied species. Thus, while in the specimen described the supraorbital semicircles are completely separated by a row of scales, in many others they are in contact, in some cases even extensively so, as, for instance, in No. 25532, in which two pairs of the semicircle scales are broadly in contact. In the large series before me they are separated in about one-half the specimens. In none is there more than one scale row between the semicircles. The single large shield separating the supraocular semicircle from the superciliary ridge just in front of the supraocular granules is remarkably constant, it being divided in two specimens only, namely, Nos. 26849 and 26990, and in these only on one side.

The keels on the scales covering the arms are often so feeble as to appear entirely absent.

Colors of living animal.—Adult male. U.S.N.M. No. 26807 (L. Stejneger No. 9007). Pueblo Viejo, near San Juan, February 13, 1900. Iris dark brown; general color above light yellowish gray, much lighter below; the saddle-shaped spots on back very pronounced blackish brown bordered by whitish; on sides an irregular series of burnt-umber brown spots, also with white margins; throat and adjacent portions of underside of neck of a delicate pale bluish green; skin of the dewlap deep orange, the distant scales canary yellow, those on anterior edge more whitish.

Another *male* (No. 26865, L. S. No. 9027, Catalina plantation, February 22, 1900).—General color above grayish drab, the saddle spots blackish brown, and indefinite blotches and spots on sides cinnamon; edge of eyelids pale yellowish; a pale semilunar stripe on keels of suboculars; dewlap orange, the thickened edge pale greenish white; otherwise as No. 26807.

Habitat.—The saddle-spotted anolis is not exclusively Porto Rican inasmuch as it is also an inhabitant of the Virgin Islands, specimens being known from St. Thomas, Tortola, Just v. Dyck, and Vieques.

It is also reported from Haiti by Prof. S. Garman, who mentions specimens in the Museum of Comparative Zoology, Cambridge, as having been collected by Professor Ackermann at Port au Prince. It is highly desirable, however, that the accuracy of the latter locality should be confirmed as no other collector seems to have obtained this species in Haiti or Santo Domingo.

In Porto Rico this species is most commonly found near sea level and in the lower altitudes. We found it still numerous, however, at nearly 900 feet, and a few specimens were collected by us at Adjuntas and by the *Fish Hawk* parties and Mr. Baker at the same place and at Cayey, but it was not found in the higher regions of El Yunque. On the whole its distribution seems to coincide with that of *Anolis cristatellus*.

It is also common both on Vieques and on Culebra islands.

List of specimens of Anolis stratulus.

U. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
25457	Male ad.	Adjuntas, Porto Rico	Jan. 30, 1899	A. B. Baker	
25522	....do	Cayey, Porto Rico	Feb. 3, 1899	.....do	
25523	....do	.....do	.....do	.....do	
25532	....do	Arroyo, Porto Rico	Feb. 2, 1899	.....do	Description, p. 653.
25533	....do	.....do	.....do	.....do	
25564	....do	Culebra Island, Porto Rico	Feb. 10, 1899	.....do	
25565	....do	.....do	.....do	.....do	
25566	Fem. ad.	.....do	.....do	.....do	
25567	Male ad.	.....do	.....do	.....do	
25568	Half gr.	.....do	.....do	.....do	
25569	....do	.....do	.....do	.....do	
25604	Male ad.	Adjuntas, Porto Rico	Jan. 29, 1899	.....do	
25605	Half gr.	.....do	.....do	.....do	
25703	Male	Caguas, Porto Rico	Jan. 9, 1899	U. S. F. C. Fish Hawk.	
25704	Female	.....do	.....do	.....do	
25706	Male ad.	.....do	.....do	.....do	
25770	....do	San Juan, Porto Rico	Jan. 3, 1899	.....do	
26807	....do	Pueblo Viejo, San Juan, Porto Rico.	Jan. 14, 1900	L. Stejneger	Description, p. 653.
26849	....do	Catalina plantation, Porto Rico.	Mar. 1, 1900	.....do	Description, p. 653.
26850	....do	.....do	.....do	.....do	
26851	Female	.....do	.....do	.....do	
26852	....do	.....do	.....do	.....do	
26860	Male	.....do	Feb. 22, 1900	.....do	
26865	Male ad.	.....do	.....do	.....do	Description, p. 651, fig., p. 652.
26877	Young	.....do	Feb. 21, 1900	.....do	
26878	Female	.....do	.....do	.....do	
26988	....do	.....do	.....do	.....do	886 feet altitude.
26989	Male ad.	.....do	.....do	.....do	Do.
26990	....do	.....do	.....do	.....do	886 feet altitude, p. 653.
26991	....do	.....do	.....do	.....do	Do.
26992	....do	.....do	.....do	.....do	Do.

List of specimens of Anolis stratulus—Continued.

U.S. N.M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
27051	Female.	Porto Rico	——, 1900	L. Stejneger	
27069	....do...	Vieques Island, Porto Rico...	Mar. 24, 1900	C. W. Richmond..	
27070	....do...	.....do	.....do	.....do	
27071	Male ...	.....do	.....do	.....do	
27072	....do...	.....do	.....do	.....do	
27073	Female.	.....do	.....do	.....do	
27074	....do...	.....do	.....do	.....do	
27163	Male ...	Utuado, Porto Rico	Apr. 6, 1900	L. Stejneger	
27181	....do...	.....do	Apr. 7, 1900	.....do	
27182	....do...	.....do	.....do	.....do	
27183	Young..	.....do	.....do	.....do	
27193	Male ...	.....do	Apr. 9, 1900	.....do	
27194	....do...	.....do	.....do	.....do	
27195	Young..	.....do	.....do	.....do	
27196	....do...	.....do	.....do	.....do	
27197	....do...	.....do	.....do	.....do	
27198	....do...	.....do	.....do	.....do	
27214	Male ...	.....do	Apr. 8–9, 1900	.....do	
27215	Female.	.....do	.....do	.....do	
27216	Male ...	.....do	.....do	C. W. Richmond..	
27241	Male ad.	Adjuntas, Porto Rico	Apr. 13, 1900	L. Stejneger	
27242	Young..	.....do	.....do	.....do	
27258	....do...	.....do	Apr. 12, 1900	.....do	
27275	Male ad.	.....do	Apr. 11–12, 1900	C. W. Richmond..	
27276	Female.	.....do	.....do	.....do	
27295	Male ...	Ponce, Porto Rico	Apr. 16, 1900	.....do	
27773	Female.	Humacao, Porto Rico	Spring, 1900	L. M. McCormick.	

ANOLIS KRUGI [a] Peters.

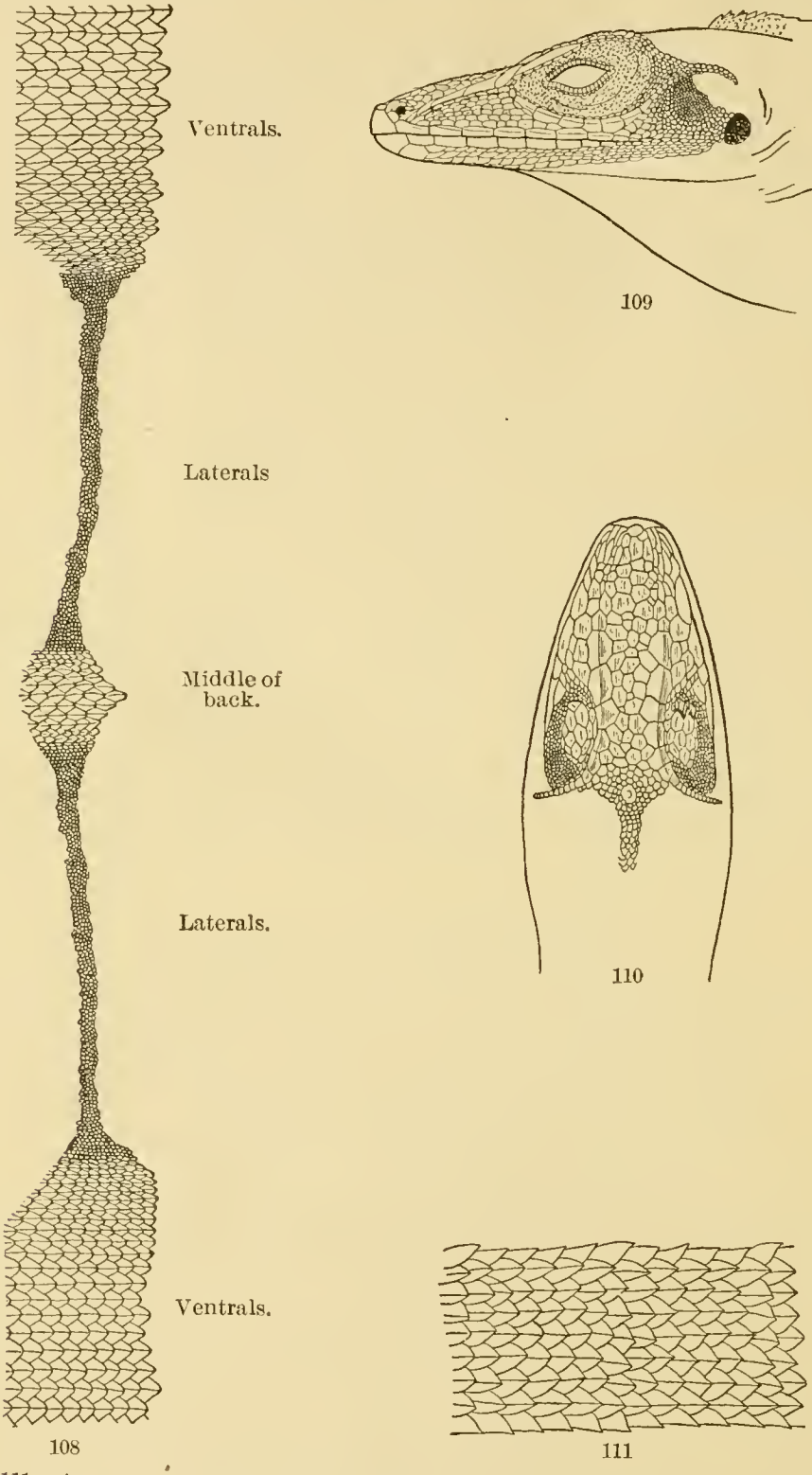
1876. *Anolis krugi* Peters, Mon. Ber. Berlin. Akad. Wiss., 1876, p. 707 (type locality, Porto Rico; types in Berlin Mus. No. 8965).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 310 (Porto Rico).—Stahl, Fauna Puerto Rico, 1882, pp. 69, 159 (Porto Rico).—Boulenger, Cat. Liz. Brit. Mus., II, 1885, p. 37 (Porto Rico).

The present species, together with *A. pulchellus* and *A. poncensis*, form a very natural group of Anoles characterized by their slender form, the longitudinally striped coloration, the strongly carinated scales in ridges on the underside, and the excessively long tail, which in uninjured specimens is much longer than twice the length of head and body. This character would have been an excellent one to separate this group from all the other Anoles in Porto Rico were it not that occasionally an old *A. gundlachi* is found in which the length of the tail also is more than twice the head and body.

Description.—Adult male. U. S. N. M., No. 26876; Catalina plantation, about 890 feet altitude; February 22, 1900. Top of head with

[a] To Leopold Krug, at one time German vice-consul at Mayaguez.

two nearly parallel frontal ridges bordering a very shallow frontal hollow; head scales keeled or wrinkled; about five scales in a row between the nostrils; supraocular semicircles separated by two rows



FIGS. 108–111.—ANOLIS KRUGI. 108, scales around middle of body. $5\frac{1}{3}\times$ natural size. 109, side of head; 110, top of head. $2\frac{2}{3}\times$ natural size. 111, side of tail at level of fifth verticil. $5\frac{1}{3}\times$ natural size. No. 26876, U.S.N.M.

of scales of nearly the same size as those paving the floor of the frontal hollow; occipital somewhat smaller than the ear-opening, separated from supraocular semicircles by four rows of scales; supraocular disk

consisting of about nine keeled, polygonal scales separated from the semicircle by one row of minute scales; two or three scales in front of the supraocular granules between the superciliaries and the supraocular semicircle; canthus rostralis consisting of four narrow, elongated scales, second and third longest; superciliary ridge consisting of one very long and narrow anterior shield followed by a double series of scales which separate the supraocular granules from those surrounding the eye; loreal rows, seven; subocular semicircle keeled, broadly in contact with supralabials; eight supralabials, keeled, the suture between sixth and seventh under center of eye; temporals granular in center with a slightly developed supratemporal line; about six median dorsal rows of scales flat and keeled, imbricated, like the ventrals, though smaller than these, the rest of the back and the sides covered by minute granules; ventral scales large, imbricate, strongly keeled, the keels forming continuous ridges, those on throat much smaller and narrower, also keeled; legs covered by keeled scales, those on upper surface of arms and on anterior aspect of femur larger, equaling or exceeding the ventrals; scales on upper surface of digits pluricarinate; digits, especially toes, very long and slender, the expansion moderate; about 20 lamellæ under phalanges ii and iii of fourth toe; tail very long, more than twice the length of head and body, moderately compressed and covered by large, subequal, keeled scales, with scarcely any indication of verticils, and the median series above forming a but slightly enlarged and feebly serrated edge; dewlap naked with distant series of scales, the edge thickened; postanal plates very slightly developed.

Dermal folds on nape and back very strongly developed in life, as shown on frontispiece.

Dimensions.

	mm.
Total length	155
Tip of snout to vent	45
Vent to tip of tail	110
Tip of snout to ear	14
Width of head	85
Fore leg	21
Hind leg	40

The *females* have merely an indication of a dewlap and a nuchal fold; they also lack postanal plates. The *young* are devoid of the dermal folds.

Variation.—There is a variation in the scutellation similar to that in all the other species, though perhaps of less importance in this species, as its differences from the nearest allies are to be found more pronounced in other features. Thus there is one single row separating the supraocular semicircles as often as two, and there is considerable variation in the number of rows on the loreal triangle (five to seven), of supra-

labials, etc. The number of rows of clearly differentiated imbricate keeled scales on the back is also variable to some extent, but they always form a narrow zone along the median line of the back.

Colors of living animal.—Adult male, Cat. No. 26874 (L. S. No. 9023), Catalina Plantation, El Yunque, 890 feet altitude, February 21, 1900. General color bright yellowish olive-green, sides of back and flanks with minute black spots, larger on back, but none along the median area occupied by the enlarged scales; from under eye through ear to groin a broad and very distinct line of canary yellow, brightest, nearly lemon yellow, on middle of flanks; a black spot immediately behind eye, but no postocular band; underside paler, more buffy; immediately below the lateral yellow band the color is more olive, with minute black specks; hind legs posteriorly suffused with ferruginous; tail crossbarred with dusky; dewlap yellowish, gradually deepening to orange toward the edge; eye dark brown, nearly black, with a faint silvery edge to the iris; eyelids edged with whitish.

Another *adult male* (No. 26876, L. S. No. 9030), caught the following day on the same plantation, was in every respect similar to the above, but in addition the temples and the dorsal surface of the neck were densely speckled with bluish white dots, the equivalent of the black dots on the back.

The *female*, No. 26875, U.S.N.M. (L. S. No. 9029), same locality and date, was above dark olive-brown, paler on sides below lateral line; the latter straw-yellow, beginning on supralabials below nostril through ear to groin; color of sides gradually fading into pale yellowish on belly; edge of eyelids whitish. Scarcely any indication of a nuchal fold or a dewlap.

The specimens (6) which I collected at Utuado (altitude about 500 feet) on April 6 had the lateral stripe pure white and not yellow. The live colors of one were noted on the spot as follows:

No. 27157, U.S.N.M. (L. S. No. 9063). Head and a broad stripe down the middle of the back, olive-brown; sides of back abruptly much darker, nearly blackish, bordered below by a pure white band extending from snout over labials through ear to groin; below this olive-brown dusted over with black; underside whitish; behind eye-opening a conspicuous black spot; dewlap orange with white scales.

After death the dorsolateral dark band fades and is replaced by numerous minute black dots, while the neck above is dusted over with minute bluish white dots. In the large specimens the outline of the median dorsal band in life is straight, while in the young ones caught to-day [April 6] it is strongly scalloped. In all six the lateral stripe is *pure* white, even in one which was just shedding, and extends to the groin. All the individuals seen were colored like these.

At Adjuntas (altitude about 1,400 feet) the specimens collected and observed on April 13 had the lateral stripe, which was distinctly

defined all the way to the groin, of the same vivid yellow color as those observed on the Catalina Plantation, but one individual with yellow stripe which was kept alive over night had the stripe white on the next morning.

Habitat.—Thus far *Anolis krugi* is only known from Porto Rico. It resembles *A. pulchellus* so closely, however, that it would not be surprising if it should be found to have been confused with the latter in the higher altitudes of St. Thomas and other islands of the Virgin group from which *A. pulchellus* is recorded.

In Porto Rico itself this species is limited to the intermediate region between about 500 and 1,500 feet altitude, though in exceptional localities specimens may be found above and below these limits. We found it common at Utuado and Adjuntas, also on the Catalina Plantation, but it is not found normally on the coast plain, where its place is taken by *A. pulchellus*, nor on the higher mountain tops.

List of specimens of Anolis krugi.

U. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
25460	Male adult	Lares, Porto Rico	Feb. 26, 1899	A. B. Baker	
25512	Female adult.	Utuado, Porto Rico	Jan. 27, 1899	do	
25527	Male adult	Cayey, Porto Rico	Feb. 3, 1899	do	
25597	do	Adjuntas, Porto Rico	Jan. 29, 1899	do	
25598	Half grown	do	do	do	
25599	do	do	do	do	
26864	Young	Catalina Plantation, Porto Rico.	Feb. 21, 1900	C. W. Richmond	
26873	Female adult.	do	Mar. 2, 1900	L. Stejneger	
26874	Male adult	do	Feb. 21, 1900	do	Description, p. 658.
26875	Half grown	do	Feb. 22, 1900	do	Do.
26876	Male adult	do	do	do	Description and fig., pp. 655, 656, 658.
26898	do	Between Catilina Plantation and Mameyes, Porto Rico.	Mar. 5, 1900	do	
26993	do	Between Mameyes and Luquillo, Porto Rico.	do	do	
27157	do	Utuado, Porto Rico	Apr. 6, 1900	do	Description, p. 658.
27158	do	do	do	do	
27159	do	do	do	do	
27160	Half grown	do	do	do	
27161	do	do	do	do	
27162	Young	do	do	do	
27200	Female adult.	do	Apr. 8–9, 1900	do	
27201	Male adult	do	do	do	
27202	do	do	do	do	
27203	do	do	do	do	
27204	do	do	do	do	
27252	do	Adjuntas, Porto Rico	Apr. 13, 1900	do	
27253	do	do	do	do	
27254	do	do	do	do	
27277	do	do	Apr. 11-12, 1900	C. W. Richmond	

ANOLIS PULCHELLUS[a] Duméril and Bibron.

1837. *Anolis pulchellus* Duméril and Bibron, Erpét. Gén., IV, p. 97 (type locality erroneously stated to be Martinique; Mus. Paris, Plée, collector).—Duméril, Cat. Méth. Rept. Mus. Paris, p. 56 (1851) (Martinique).—Reinhardt and Lütken, Vid. Meddel. Naturh. Foren. (Copenhagen) 1862, p. 257; author's separate p. 105 (St. Thomas, St. Croix, Tortola, Just v. Dyck, Vieques, Porto Rico).—Bocourt, Miss. Sci. Mex., Zool. Rept., livr. 3, 1874, pl. xvi, figs. 28–28*a* (type).—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 706 (Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 310 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 69, 159 (Porto Rico).—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 25 (St. Thomas, Porto Rico).—Boulenger, Cat. Liz. Brit. Mus., II, p. 67 (1885) (St. Thomas).—Garman, Bull. Essex Inst., XIX, 1887, p. 48 (Haiti, Porto Rico, St. Thomas).

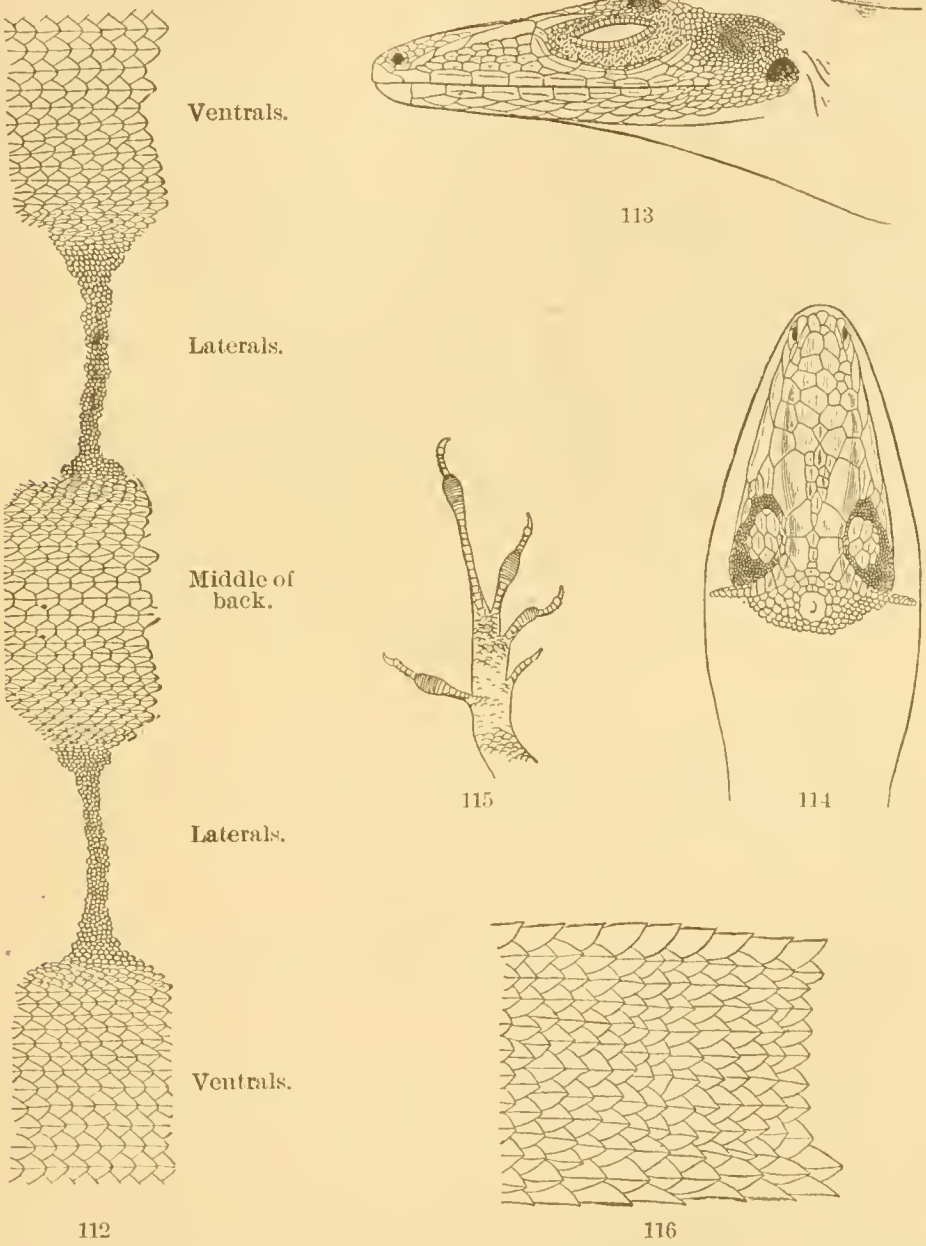
The type locality of *Anolis pulchellus* is given as Martinique, collected by Plée, but it can be asserted with confidence that the statement is erroneous, and that the species does not occur in that island, nor in fact on any of the Caribbean islands south of the Virgin group. It is only one of the many instances in which Plée's reptiles were accredited in Paris to Martinique because shipped from this island. Plée collected both in Porto Rico and in St. Thomas, and from one of these islands the type has come.

Duméril and Bibron's description of *A. pulchellus* agrees best with the form here so designated. It certainly does not apply to either of the species we call *A. krugi* or *A. poncensis*. On the other hand, there are a few discrepancies in the relative size of the dorsal, lateral, and ventral scutellation; but, although rather detailed, the original description is not sufficiently precise. I have not been able to compare my Porto Rican series with St. Thomas specimens, and there is consequently a possibility that they may be different, and that in the later case the name of *A. pulchellus* may be applicable to specimens from St. Thomas only. In this connection I wish to call attention to the possibility that although only one species of this group of *Anolis* is recorded from St. Thomas, namely, *A. pulchellus*, at least one other may have been confounded with it and overlooked. A large series of these lizards from the Virgin Islands is therefore a great desideratum as well as a direct comparison with the types in Paris.

This species is closely allied to *A. krugi*, differing chiefly in the greater extension of the enlarged keeled scales on the back, in the much lower and narrower head which is covered with larger scales. In *A. krugi* the interorbital space is consequently wider with larger and more numerous scales between the supraorbital semicircles, and the loreal rows are also more numerous. The adult males are easily told apart, the *A. pulchellus* having the skin of the dewlap crimson, while in *A. krugi* it is orange.

[a] Pretty.

Description.—*Adult male:* U. S. N. M. No. 26809; Pueblo Viejo, near San Juan, about sea level; February 17, 1900. Top of head with two slightly curved low frontal ridges bordering a very shallow frontal hollow; head scales keeled and wrinkled; five scales in a row between nostrils; supraocular semicircles separated by one row of scales considerably smaller than those paving the floor of the frontal hollow;



FIGS. 112-116.—ANOLIS PULCHELLUS. 112, scales around middle of body. 5⅓ × natural size. 113, side of head; 111, top of head. 2⅔ × natural size. 115, underside of hind foot. 2 × natural size. 116, side of tail at level of fifth verticil. 5⅓ × natural size. No. 26799, U.S.N.M.

occipital about the size of the ear-opening, separated from the supraocular semicircle by three rows of scales; supraocular disk composed of seven or eight enlarged, polygonal, keeled scales, separated from the semicircle by one row of minute scales; two scales in front of the supraocular granules between the superciliaries and the supraocular semicircle; canthus rostralis consisting of four elongate, narrow shields, the

third almost as long as the others together; superciliary ridge consisting of one very long and narrow anterior shield, followed by a double row of small scales separating the supraocular granules from those surrounding the eye; loreal rows four; subocular semicircle keeled, broadly in contact with supralabials; eight supralabials, keeled, the sixth being under the center of the eye; temporals granular with a well-developed double supratemporal line of scales; dorsal scales small, much smaller than ventrals or those on upper side of arm, keeled, gradually fading into the lateral granules; ventrals large, imbricate, sharply keeled, the keels forming continuous ridges, those on throat much smaller, narrow; arms above and femur anteriorly covered with keeled scales fully as large as the ventrals; scales covering hands and feet above strongly pluricarinate; digits very long and slender, expansion moderate; 20 lamellæ under phlanges ii and iii of fourth toe; tail very long, more than twice the length of head and body, moderately compressed, covered by large, imbricated, keeled scales with but very slight indications of verticils, and the median series above consisting of similar only somewhat larger scales forming a feebly serrated edge; dewlap naked with distant series of scales, the edge thickened; postanal plates scarcely indicated.

Dermal fold on nape and back very strongly developed in life.

Dimensions.

	mm.
Total length	145
Tip of snout to vent	42
Vent to tip of tail	103
Tip of snout to ear	14
Width of head	7
Fore leg	17
Hind leg	31

The *females* have a mere indication of dewlap and nuchal fold; the *young* are devoid of both.

Variation.—The most important variation in this species appears to be in the size of the dorsal scales. Thus in the specimen figured the median dorsals are nearly as large as the ventrals, while in the one described they are much smaller. The single row of scales separating the supraocular semicircles is sometimes disconnected sufficiently to allow a pair of the semicircular shields to touch. The loreal rows vary between four and five, exceptionally six, etc. The relative size of the scales on the interorbital space and in the frontal hollow is also variable.

Colors of living animal.—Adult male; U.S.N.M. No. 26799 (L. S. No. 9001); San Antonio, near San Juan, February 12, 1900. Iris dark brown; upper surface dull clay-colored, more dusky along the median line; head darker, more brownish; from eye to half way down the side of neck a broad black line, and another on the edge of the lower

lip; a third blackish line, but considerably fainter, on lower edge of mandible, being more distinct between ear and shoulder; flanks and underside Naples-yellow, a stripe on upper labials over ear to shoulder more primrose-yellow; on flanks a series of oblique, elongated spots of brightest gamboge-yellow narrowly margined with black; skin of dewlap bright crimson anteriorly verging into dark rose-pink, posteriorly into orange, the distant scales arranged in rows and colored gamboge-yellow.

Three specimens (No. 26800–2) collected at Cataño, near San Juan (sea level), the next day were browner above and postocular streak less dark; no yellow spots on sides.

An *adult male* (No. 26809; L. S. No. 9018) collected at Pueblo Viejo (also near San Juan and at sea level) on February 17 was above almost olive-yellow, gradually fading into the pale waxy-yellow of the belly; head nearly tawny ochraceous; supralabials to ear primrose-yellow; in continuation with this line a well-defined dusky band from ear to loin sprinkled minutely with gamboge-yellow and with several irregular cross markings of the same color on flanks; tail and limbs faintly crossbarred with dusky; a black postocular spot, but a dark postocular band is only faintly indicated; dewlap crimson as in No. 26799.

Another *adult male*, same locality and date (No. 26810), is similar, but color above more dark olive, strongly contrasting with the flanks, which are bright Indian-yellow; a few dusky specks in the olive-colored area.

In none of the above specimens was there any lateral pale band beyond the shoulders. I have recorded two specimens, however, both taken at Pueblo Viejo, the same locality as the ones described above, on February 14 and 17, respectively, which had a light band on the flanks when alive. Of these, No. 26808 (L. S. No. 9015) is quite *young*. Above rich tawney brown, with irregular dusky markings; upper mandible and a stripe over the ear to the shoulder sulphur-yellow, continued behind to the groin, but duller ochre-yellow, and bordered above and below by a dusky line; underside pale straw-yellow.

The other specimen, No. 26811 (L. S. No. 9020), is quite similar to Nos. 26809 and 26810, described above, but upper side and flanks are rather densely speckled with blackish; the supralabial-supraauricular band is primrose-yellow to the shoulders and continues beyond as a distinct gamboge-yellow band to the groin, the flanks underneath it being pale olive with yellow, dusky-margined vertical markings like No. 26799; as in all the other specimens, the dewlap is crimson.

Curiously enough this yellow lateral band, which in this species appears to be exceptional, fades out entirely in the alcoholic specimens, while it is permanent in the allied *A. krugi*.

Habitat.—*Anolis pulchellus*, as mentioned above, is not confined to Porto Rico, but is recorded as numerous in the Virgin Islands, speci-

mens from St. Thomas, St. Croix, Tortola, and Just van Dyck being in the Copenhagen museum. The latter also has it from Vieques, though neither the *Fish Hawk* expedition nor I myself collected it on that island, and for some unexplained reason it may be scarce around Isabella Segunda, the only locality visited by us. Prof. S. Garman also mentions specimens in the Museum of Comparative Zoology, Cambridge, as having been collected by Professor Ackermann at Port au Prince, Haiti; but, as in the case of *Anolis stratulus*, this locality is unconfirmed, and no other collector has apparently found this species in Haiti. Is it possible that there is some error involved in Professor Ackermann's record and that the specimens of both species were actually collected in St. Thomas, although possibly shipped from Haiti?

In Porto Rico *A. pulchellus* is confined to the coastal plain and its extensions into the larger river valleys up to an altitude of about 500 feet. The highest localities from which we have it are Caguas and Utuado. At the latter place it occurs alongside of *A. krugi*, which occupies the higher altitudes.

List of specimens of Anolis pulchellus.

U.S. N.M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
25482	Male ad.	Añasco, Porto Rico	Jan. 21, 1899	A. B. Baker	
25483	do	do	do	do	
25484	do	do	do	do	
25485	do	do	do	do	
25486	do	do	do	do	
25487	do	do	do	do	
25488	Female	do	do	do	
25489	Half gr.	do	do	do	
25501	do	San Juan, Porto Rico	Jan. 6, 1899	do	
25502	do	do	do	do	
25503	Young	do	do	do	
25504	do	do	do	do	
25505	do	do	do	do	
25506	do	do	do	do	
25507	do	do	do	do	
25513	Half gr.	do	do	do	
25514	do	do	do	do	
25515	Young	do	do	do	
25516	Half gr.	do	do	do	
25517	Young	do	do	do	
25518	do	do	do	do	
25519	do	do	do	do	
25639	Half gr.	Cataño, Porto Rico	Jan. 4, 1899	U. S. F. C. Fish Hawk.	
25698	Male ad.	Caguas, Porto Rico	Jan. 9, 1899	do	
25699	Fem. ad.	do	do	do	
25700	Half gr.	do	do	do	
25701	Young	do	do	do	
25702	do	do	do	do	
25714	Male	do	Jan. 8, 1899	do	
25715	do	do	do	do	

List of specimens of Anolis pulchellus—Continued.

U. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
25716	Young..	Caguas, Porto Rico.....	Jan. 8, 1899	U. S. F. C. Fish Hawk.	
25717	Male ...	Cataxo, Porto Rico	Jan. 12, 1899	.....do	
26086	Half gr .	Hucares, Porto Rico.....	Feb. 14, 1899	.....do	
26090	Young..	.....do	Feb. 15, 1899	.....do	
26799	Male ad.	San Antonio, San Juan, Porto Rico.	Feb. 12, 1900	L. Stejneger	Figs. 112–116; description, p. 662.
26800	Young..	Cataño, San Juan, Porto Rico.	Feb. 14, 1900	.....do	Description, p. 663.
26801	....do ...	.....do	.....do	.....do	
26802	....do ...	.....do	.....do	.....do	
26808	....do ...	Pueblo Viejo, San Juan, Porto Rico.	.....do	.....do	Do.
26809	Male ad.	.....do	Feb. 17, 1900	.....do	Description, p. 661.
26810	....do ...	.....do	.....do	.....do	Description, p. 663.
26811	....do ...	.....do	.....do	.....do	Do.
26812	....do ...	.....do	.....do	.....do	
26813	Female.	.....do	.....do	.....do	
26814	....do ...	.....do	.....do	.....do	
26995	Young..	Between Mameyes and Luquillo, Porto Rico.	Mar. 5, 1900	.....do	
26996	....do ...	.....do	.....do	.....do	
26997	....do ...	.....do	.....do	.....do	
26998	....do ...	.....do	.....do	.....do	
27199	Male ad.	Utuado, Porto Rico.....	Apr. 8–9, 1900	.....do	
27282	....do ...	Ponce, Porto Rico	Apr. 16, 1900	.....do	
27283	Female.	.....do	.....do	.....do	
27284	Male ...	.....do	.....do	.....do	
27285	Female.	.....do	.....do	.....do	
27286	....do ...	.....do	.....do	.....do	
27287	....do ...	.....do	.....do	.....do	
27288	....do ...	.....do	.....do	.....do	
27298	Male ...	.....do	.....do	C. W. Richmond ..	
27299	Female.	.....do	.....do	.....do	
27300	Half gr .	.....do	.....do	.....do	
27301	Young..	.....do	.....do	.....do	
27302	Half gr .	.....do	.....do	.....do	
27303	....do ...	.....do	.....do	.....do	
27304	Young..	.....do	.....do	.....do	

ANOLIS PONCENSIS,[a] new species.

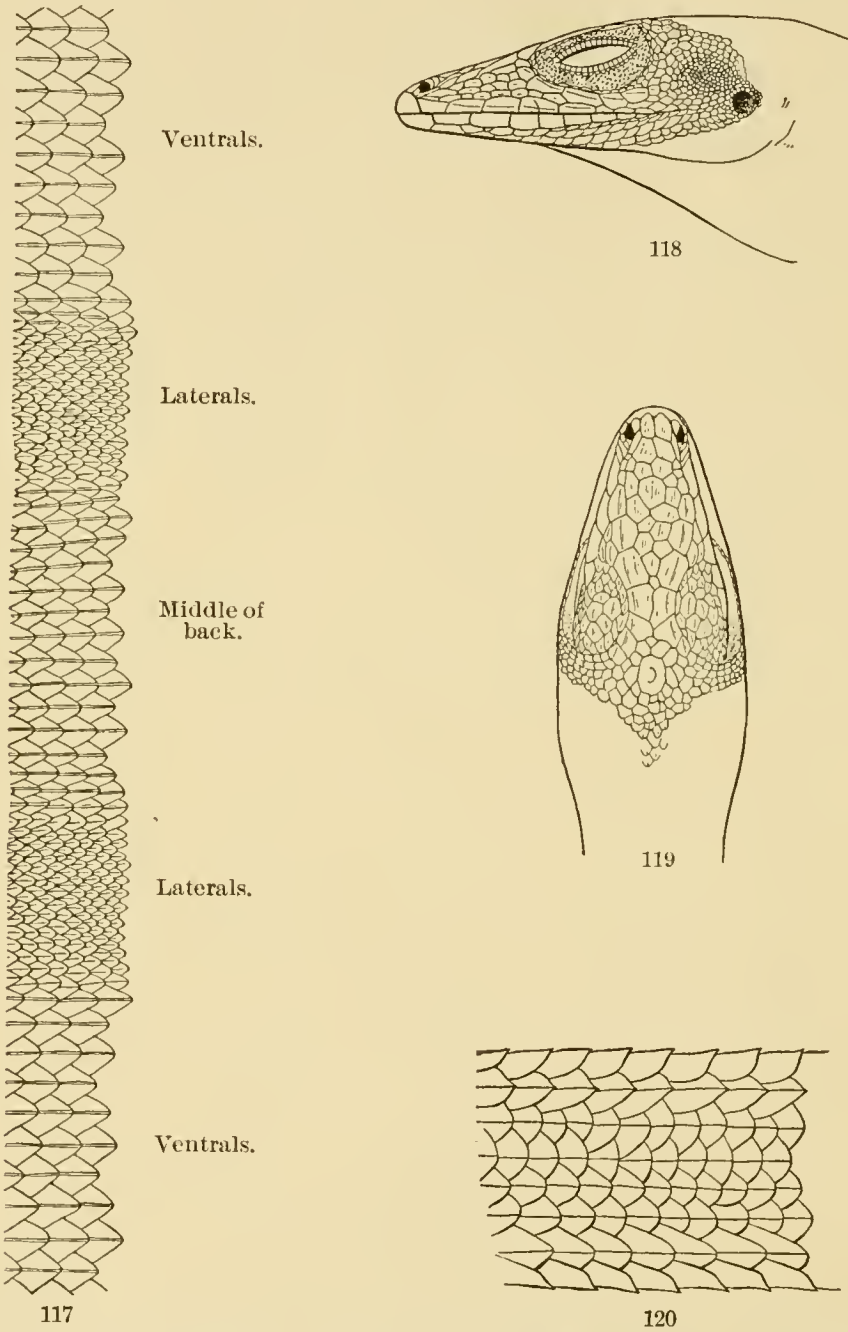
Diagnosis.—Dorsal scales rhomboidal, imbricate, sharply keeled, large, much larger than the laterals and nearly as large as the ventrals; laterals not granular, and, like ventrals, also keeled; tail moderately compressed, not verticillate, upper median row of scales scarcely larger than the others, upper edge thus but faintly serrate; digital expansion moderate; occipital shield about the size of the ear-opening,

[a] From Ponce, a city on the south side of Porto Rico, in the vicinity of which the type was collected.

separated from supraorbital semicircles by one or two scale-rows; semicirculars separated by one row of scales or in contact; dewlap of male covered with large, keeled, pointed, imbricate scales.

Type.—No. 27294, U.S.N.M.; hills 3 miles east of Ponce, P. R.; collector, C. W. Richmond.

Habitat.—Porto Rico.



FIGS. 117–120.—ANOLIS PONCENSIS. 117, scales around middle of body. $5\frac{1}{3}$ × natural size. 118, side of head; 119, top of head. $2\frac{2}{3}$ × natural size. 120, side of tail at level of fifth verticil. $5\frac{1}{3}$ × natural size. No. 27294, U.S.N.M.

Description.—Adult male; U.S.N.M., No. 27294; hill 3 miles east of Ponce; April 16, 1900. Top of head with two slightly curved and low frontal ridges; frontal hollow very shallow; head scales more or less wrinkled or keeled; four scales in a row between the nostrils; supraocular semicircles broadly in contact; occipital slightly larger

than the ear-opening, separated from the supraocular semicircles by one row of flat scales; supraocular disk consisting of five or six polygonal keeled shields conspicuously larger than the surrounding scales, which are also keeled, and of which one row separates the disk from the semicircle; two scales in front of the supraocular scales between the superciliaries and the supraocular semicircle; canthus rostralis consisting of four elongate narrow shields, the first one very small, the third longest; the superciliary ridge consisting of an anterior long and narrow shield and a series of scales contrasting in size with the granules surrounding the eye, but not with the small scales of the supraorbital region; loreal rows three or four; subocular semicircle keeled, broadly in contact with the supralabials, not bending upward behind the orbit; supralabials seven, the suture between fifth and sixth being under the center of the eye; central temporals large granules; a well-developed double row of scales forming a supratemporal line; dorsal scales rhomboidal, imbricate, sharply keeled, the keels forming continuous parallel ridges, large, much larger than the laterals and nearly as large as the ventrals; laterals similar to the dorsals, but much smaller and less sharply keeled; ventrals like the dorsals, only more pointed and slightly larger; scales on throat and chin similar, keeled, only considerably smaller, though larger than the laterals; arms and legs covered with similar imbricated, keeled scales nearly as large as the ventrals; hands and feet above with pluricarinate scales; digits long and slender, expansion moderate; 18 lamellæ under phalanges ii and iii of fourth toe; tail very long, more than twice head and body, moderately compressed, covered with large keeled scales forming continuous ridges, with scarcely any indications of verticillation, the upper edge being but faintly serrated; dewlap entirely covered with imbricated, pointed, and keeled scales nearly as large as the ventrals, edge not thickened; postanal plates very small.

Dimensions.

	mm.
Total length (tail defective)	----
Tip of snout to vent	43
Vent to tip of tail (tail defective)	----
Tip of snout to ear	12.5
Width of head	7
Fore leg	17
Hind leg	31

A young *female* without dewlap and postanal plates (No. 27290) measured as follows:

	mm.
Total length	116
Tip of snout to vent	34
Vent to tip of tail	82

Variation.—The type specimen above described is rather extreme in some points of the scutellation of the head, namely in the wide contact of the supraocular semicircles, which probably are more commonly separated by a single row of scales, and in the single row separating the occipital shield from the semicircles, there being usually two rows. No. 27290 is rather extreme in the latter respect, the occipital being broken up so that there appears to be three such rows (fig. 121.)

The degree of distinctness of the keels or wrinkles on the head scales is greatly variable, as in some of the younger specimens these scales are smooth or nearly so.

Color of living specimens.—Adult male; No. 27294, U.S.N.M. (L. S. No. 9068) type; 3 miles east of Ponce; April 16, 1900. Ground color above drab verging on tawny-olive on the tail and strongly washed with cinnamon on the sides; middle portion of back about five scales wide, uniform without spots, but on the sides of back and on flanks there are three longitudinal series of dusky spots on each side, about seven spots in each series from axilla to groin; these spots are not permanent, but appear and disappear at intervals; a pale supratemporal line, washed with pale rufous, from posterior edge of supraocular disk; below this an elongate blackish spot involving the eye and part of loreal triangle strongly tinged with tawny on the latter and on temples; edge of eyelids deep rufous; below the dark spot a pure white line on the lower row of scales of loreal triangle, suboculars and lower temporals to above the ear; several oblique whitish lines, which proceeding from the throat join on side of neck under the ear, and a short line behind the shoulder form a lateral whitish stripe which disappears at the anterior third of the distance between shoulder and groin; a dusky line below the white one, involving the upper and lower labials and continued to a little beyond the lower edge of the ear; a faint dusky stripe across upper arm and on side behind the axilla bordering the pale lateral neck stripe below; underside whitish, washed faintly with tawny, the throat with several longitudinal series of narrow, disconnected, dusky stripes; a faint dusky stripe along the median line of the belly; tail underneath whitish, strongly washed with tawny-olive, the pale color anteriorly extending upward on the sides of the tail so as to form a series of numerous pale crossbands which do not reach the median line above; the posterior half of tail regularly barred with wide dark and pale rings; limbs above like the back, the hind limbs with indistinct dusky markings washed with rufous; a small dewlap perfectly covered with large white scales, so as to entirely

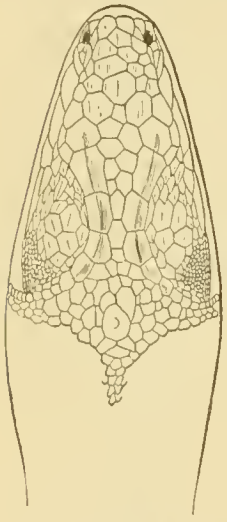


FIG. 121.—ANOLIS PONCENSIS. Top of head. 4 × natural size. No. 27290, U.S.N.M.

hide the skin underneath, even when highly distended, the color of which, however, appears to be whitish; iris blackish brown.

Three *younger* specimens collected at the same place and time differ in coloration in that they have a well-defined, nearly white median dorsal line, one whole and two half scales to three whole scales wide, bordered on each side by a wide blackish-brown band, which is a continuation of the transocular blackish patch seen in the adult; below this another, but very narrow, whitish line on the boundary between back and sides in continuation of the subocular white band.

Habitat.—Thus far this new species is only known from the type locality, 3 miles east of the city of Ponce. It was on the very last day of our collecting in Porto Rico that we almost stumbled upon this very distinct novelty. On the morning of that day Dr. Richmond went out alone collecting, as I myself was invalided so as to be able to walk any distance only with difficulty, and at noon he returned with a single lizard. This I at once recognized as an unknown species, and as Dr. Richmond fortunately remembered the exact spot where he collected it we took at once a carriage and drove out to the place, which is on the south side of the military road. On the side of a little hill, rising less than a hundred feet up from the coastal plain, and consisting of disintegrating coral limestone, we found a few additional specimens, mostly younger ones, among the scant grass and weeds. They were exceedingly agile, like *Anolis pulchellus*, which was found in the same locality, but were not common.

Remarks.—Though closely allied to *Anolis krugi* and *A. pulchellus*, the present species is very distinct, and much more so than these are from each other; in fact, its uniform covering of large, strongly imbricated keeled scales, with hardly any granules anywhere, is almost unique. The perfectly covered white dewlap and the coloration are also very characteristic.

List of specimens of Anolis poncensis.

U. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
27289	Male ad.	Ponce, Porto Rico	Apr. 16, 1900	L. Stejneger	
27290	Female	do	do	do	Description, p. 668, fig. 121.
27291	Young	do	do	do	
27292	do	do	do	do	
27293	do	do	do	do	
27294	Male ad.	do	do	C. W. Richmond	Type. Figs. 117-120.

Genus CYCLURA[a] Harlan.

1824. *Cyclura* Harlan, Journ. Phila. Acad., IV, p. 250 (type *C. carinata*).
1830. *Metopoceros* Wagler, Nat. Syst. Amph., p. 147 (type *Iguana cornuta*).
1845. *Metapoceros* Gray, Cat. Liz. Brit. Mus., p. 188 (errore).
1866. *Metapocerus* Cope, Proc. Phila. Acad., 1866, p. 124 (emended).

CYCLURA CORNUTA[b] (Bonnaterre).

1789. *Lacerta cornuta* Bonnaterre, Tabl. Encycl. Erpét., p. 40, pl. iv, fig. 4 (type locality, Santo Domingo).—*Metopoceros cornutus* Duméril and Bibron, Erpét. Gén., IV, 1837, p. 211.—Guenther, Trans. Zool. Soc. London, XI, 1882, p. 218, pls. xliii–xliv (locality unknown).—Boulenger, Cat. Liz. Brit. Mus., II, 1885, p. 188.—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, p. 26 (Mona Island, Haiti).—*Cyclura cornuta* Cope, Proc. Amer. Philos. Soc., XXIII, 1885, p. 263.

There are certain indications that the large rock iguana which lives on Mona Island is different from what is usually considered typical *Cyclura cornuta* from Haiti, but lack of specimens from the latter island for direct comparison with our four Mona specimens makes it impossible to prove it at present. These lizards are scarce in collections, and in no one museum is there at present material enough to decide the question; in fact, there is only one museum which has specimens both from Haiti and from Mona, one from the former and two from the latter island.

The first character to attract my attention was the absence of an intercalary row of scales between rostral and nasals in all the known specimens from Mona Island, six in all, namely, four in the U. S. National Museum and two in the museum at Hamburg. Moreover, all our Mona specimens have a double row of scales between the median frontal horn and the last one of the prefrontal shields or horns.

In the Haitian or Santo Domingan specimens which I have seen, or of which I have record, these features are as follows: In the type (from Santo Domingo) described by Duméril and Bibron the series of scales between rostral and nasal is well developed; so I found it in the specimen in the Hamburg Museum (No. 1047); so also in the specimen from Gonaives, Haiti, in the Vienna Hof Museum (collected by Erber in 1878); and so Prof. S. Garman writes me that it is in the Haitian specimen in the Museum of Comparative Zoology (from Jeremie, Haiti, collected by Dr. D. F. Weinland). But according to a recent letter from my friend, Dr. Siebenrock, there is another specimen in the Vienna Museum from Haiti in which "the rostral is separated from the nasals by a series of scales only laterally but not medially." Consequently, out of six Mona specimens and five from

[a] κύκλος, ring; οὐρά, tail. [b] Latin=horned.

Haiti, one from the latter agrees at least partly with the former in the relation of the rostral to the nasals.

In our four Mona Island specimens (the Hamburg specimens were not examined for this character) the frontal median horn is separated from the nearest prefrontal shield or horn by a double row of scales. In the type of *C. cornuta* there seems to be no intervening series at all ("la troisième plaque * * * touche à la protubérance frontale," Duméril and Bibron, p. 212); in the Cambridge specimen "the horn is separated from the hindmost of the three enlarged scales by a single row of very narrow scales" (S. Garman in letter); according to Dr. Siebenrock's statement to me the Vienna specimen from Gonaives has likewise only one row of intervening scales, and as he makes no exception for the second specimen I conclude that this is similar.

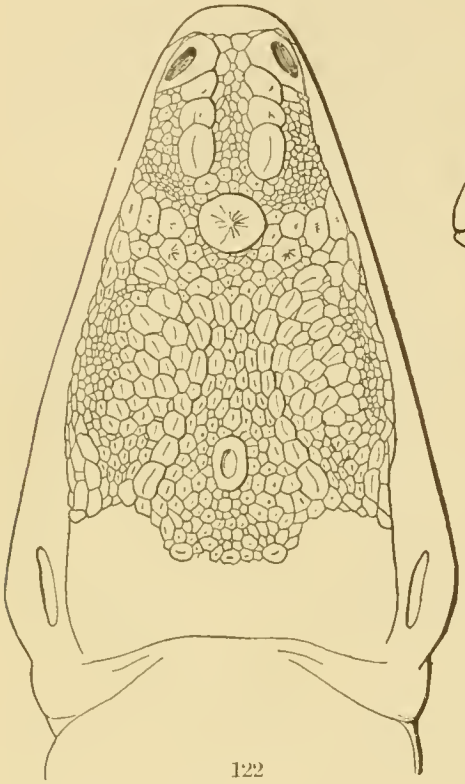
As will be noted further on, there may be other differences, more important, perhaps, though less obvious, but which have not been verified in the whole series. There is consequently very good reason for believing that the Mona Island iguana is distinct, and I would have hesitated but little to describe it as such were it not for Dr. Günther's description and figure of a specimen from an unknown locality in the Zoological Garden of London.[a] These agree so minutely with the specimens from Mona that if his specimen did not come from that island the idea of the existence of two species would most likely have to be abandoned, for it must be admitted that the chances of a Mona Island iguana having found its way to the Zoological Garden in London as early as 1882 are very slight, and it is certainly much more likely that it came from Haiti or Santo Domingo. There is of course a possibility that two forms occur in the latter island, one of which is identical with the Mona form, but the whole matter is thrown into such uncertainty that it seems best to await the accumulation of more authentic material before deciding.

In calling attention to the differences thus far noticed others may be in a position to judge better, and I therefore subjoin the few additional notes which I made in comparing the three specimens from Haiti and Mona in the museum at Hamburg. In the adult Mona specimen I found the enlarged keeled scales on the forearm much smaller than in the one from Haiti (ratio 20 to 12), the preauricular tubercles were much larger, also the median frontal horn; the two combs on the third toe were very large in the one from Mona, much larger than in the Haitian specimen.

Description.— Young; U.S.N.M. No. 29367; Mona Island; August, 1901; B. S. Bowdish, collector. Rostral wide, as wide as mental, broadly in contact with nasals; nasal large, ovoid, perforated by a large nostril of the same shape; on each side of the top of the snout, immediately behind and adjoining the nasal, a series of three large shields,

[a] Trans. Zool. Soc., XI, 1882, p. 218, pl. XLIV.

strongly convex, the posterior pair particularly so, and almost keeled; the series are separated by numerous small scales anteriorly about three in a row, posteriorly four; the anterior pairs subequal, the posterior one nearly as long as the two others together, those of each series broadly in contact without any intervening scales; separated from these prefrontal series by two rows of scales there is a large rounded, median, frontal shield, its center on a line with the anterior edge of the orbit,



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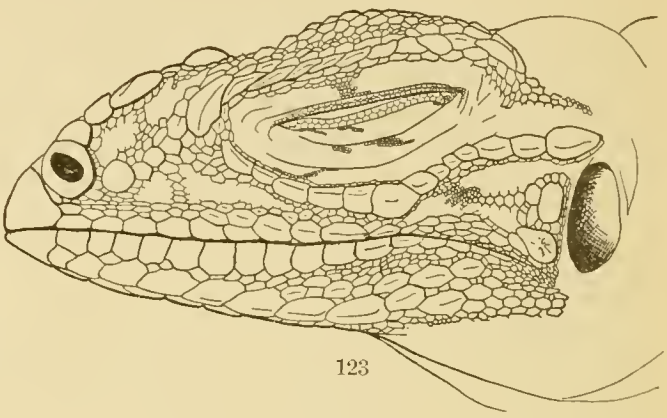

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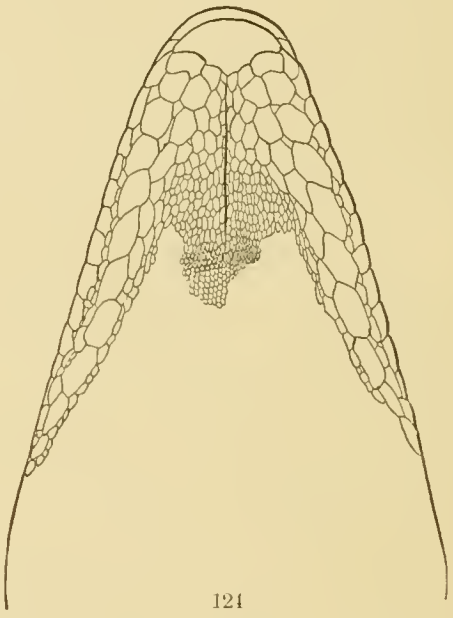

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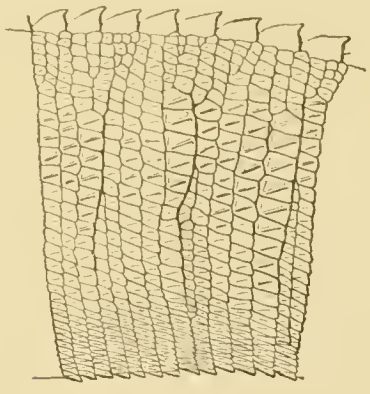

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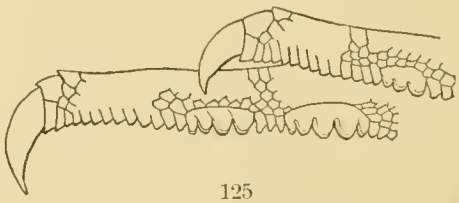

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FIGS. 122–126.—CYCLURA CORNUTA. 1½ × natural size. 122, top of head; 123, side of head; 124, underside of head; 125, toes, showing "comb;" 126, scales on side of tail. No. 29367, U.S.N.M.

convex and wrinkled radially from the center; supraocular semicircles evident, though the component keeled scales hardly exceed the similar scales which form the supraorbital disk; semicircles separated by about four rows of smaller keeled scales; occipital located well forward between the semicircles, from which it is separated by three rows of scales, on a line between the posterior borders of the orbits, smaller than

the nasals; one large keeled canthal scale nearest the orbit, the anterior ones but slightly developed; a well-developed series of strongly keeled suboculars continued backward as a supratympanic series to above the ear; ten supralabials, the suture between the last two under the center of the eye; a series of small scales separating the suboculars and the supralabials; above the angle of the mouth and in front of the lower edge of the ear a large tubercular shield and above it about the middle of the front edge of the ear another shield, convex and almost as large; tympanum elliptical, erect, large; eleven lower labials to the center of the eye; a series of enlarged malar scales, the posterior ones strongly keeled and separated from the lower labials by several rows of small scales; dorsal and ventral scales small, about eleven contained in the vertical diameter of the tympanum, rhomboidal, obliquely keeled, the keels pointing toward the median line; from the occiput along the median line of the neck and back a series of enlarged strongly keeled scales forming a low serrated crest, which is much reduced between the shoulders, absolutely interrupted on the rump, and consequently not continuous with the caudal crest; length of the crest scales on the middle of the back three to the vertical diameter of the tympanum, 51 in the dorsal crest from shoulder to rump; throat covered with scales similar to the ventrals but smaller; sides and underside of neck with numerous folds, a large median one almost large enough to be called a dewlap, joining posteriorly a strong transverse fold; upper surface of limbs with slightly imbricated, keeled, posteriorly pointed scales, somewhat larger than the dorsals, on the lower arm about seven, on the tibia about four to the vertical diameter of the tympanum; a single series of about eighteen femoral pores; inner side of second toe with one "comb," of third toe with two "combs" (see fig. 125); tail compressed, covered with obliquely keeled scales in vertical rows forming faintly indicated verticils, about four rows of the larger scales to a verticil; tail surmounted by a crest of enlarged, pointed triangular scales forming a strongly serrated edge.

Dimensions.

	mm.
Total length	456
Tip of snout to vent	176
Vent to tip of tail	280
Tip of snout to ear	37
Width of head	28
Fore limb	70
Hind limb	125
Vertical diameter of tympanum	8

Variation.—I have described purposely a young specimen, partly because it is the best preserved one in our collection, but mostly because the young show the individual scales and shields better than the older ones. In these, from age and excessive wear, and also because

so many of the head shields develop into horns and tubercules, the boundaries between the scales and their shapes become obscured.

The adults which reach a length of at least 1 meter are characterized by the enormous development of some of the head shields into pointed horns or cones, and the increase in the height of the spines which form the crests on neck, back, and tail.

Thus, in No. 29366, an adult male about 1.06 m. long, the frontal horn is 9 mm. high and the lower preauricular shield has grown out to form a stout horn not less than 12 mm. high; the posterior pair of the prefrontal shields are also raised, forming hornlike protuberances; many other scales have their keels form sharp ridges or knobs; thus several at the posterior end of the superciliary ridge, the median preauricular, a smaller shield in front of the big lower preauricular at the angle of the mouth, one or two of the posterior suboculars and the posterior scales of the mandibular or malar series. The nuchal crest is very low, scarcely more than 2 mm. high, but the scales of the median dorsal series have developed into flattened, more or less falcate spines, the longest of which are 17 mm., while the spines of the caudal crest, which are stronger and broader at the base, measure no less than 19 mm. In this specimen the vertical diameter of the tympanum is 17 mm. and equals seven of the larger keeled scales on the forearm and ten dorsal scale rows. The femoral pores are in two rows, with a few additional forming a third row near the upper end. Length from tip of snout to ear, 101 mm.; width of head, exclusive of preauricular spines, 75 mm.

No. 29365, another adult male, differs but little from the above, the main difference being that the preauricular spines are hardly developed. The femoral pores are arranged in three unequal rows, 18–19 in the anterior row, which is the longest.

The adult female (No. 29642) does not differ much, except that the spines are somewhat smaller; thus the lower preauricular spine is only 9 mm., the highest dorsal also 9, and the highest caudal 13 mm. The femoral pores are not large and are arranged in one complete series, with a second incomplete in the intervals between the first.

The number of dorsal spines seems to be quite constant, varying as it does in our four specimens only between 50 and 55, as follows: No. 29365, 50; No. 29366, 50; No. 29367, 51; No. 29642, 55.

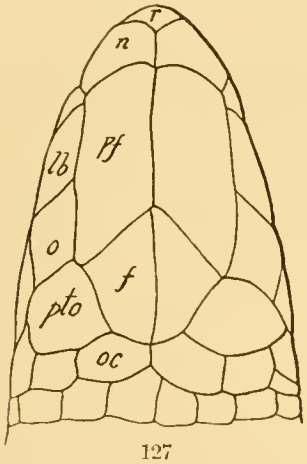
Habitat.—If the present species is correctly referred to *Cyclura cornuta*, the habitat embraces the whole island of Haiti as well as Mona. In the latter island Mr. Bowdish found it among the rocks.

List of specimens of Cyclura cornuta.

U. S. Nat. Mus. No.	Sex and age.	Locality.	When collected.	By whom collected.	Remarks.
29365	Adult male	Mona Island	Aug., 1901.	B. S. Bowdish	Description, p. 674.
29366	do	do	do	do	Description, p. 674.
29367	Young	do	do	do	Specimen figured and described, pp. 671, 672.
29642	Adult female	do	do	do	

Genus AMPHISBÆNA[a] Linnæus.

1758. *Amphisbæna* Linnæus, Syst. Nat., 10th ed., I, p. 229 (type *A. fuliginosa*).
1843. *Typhloblanus* Fitzinger, Syst. Rept., p. 22 (type *A. cæca*).
1844. *Sarea* Gray, Cat. Tort. Brit. Mus., p. 71 (type *A. cæca*).
1861. *Diphalus* Cope, Proc. Phila. Acad., 1861, p. 75 (type *D. fenestratus*).



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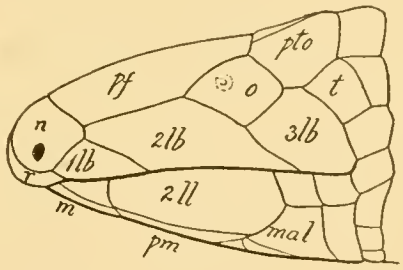

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Figs. 127–128.—Shields on head of Amphisbæna. *f*, frontal; *lb*, supralabial; *1lb*, first supralabial; *2lb*, second supralabial; *3lb*, third supralabial; *2ll*, second lower labial; *m*, mental; *mal*, malar; *n*, nasal; *o*, ocular; *oc*, occipital; *pf*, prefrontal; *pm*, postmental; *pto*, postocular; *r*, rostral; *t*, temporal.

The Amphisbænians are legless, hence snakelike, lizards with the eyes concealed under the skin of the head, hence blind, or nearly so. The Spanish name, "*Culebrita ciega*," indicates the same. The animals at first sight recall more a worm than a lizard, their flesh-colored tint and arrangement of the skin in rings giving them the appearance of large earthworms.

Two species of *Amphisbæna* occur in Porto Rico, which may be distinguished as follows:

a^1. Body rings 220–230; suture between nasal shields very short, one-fifth or less of the prefrontal suture; one temporal ..... *A. cæca*, p. 676.
a^2. Body rings about 250; nasal suture long, more than one-third of the prefrontal suture; no temporal ..... *A. bakeri*, p. 681

[a] ἀμφίσβαινα, a species of serpent supposed to be able to move both forward and backward.

AMPHISBÆNA CÆCA[a] Cuvier.

1829. *Amphisbæna cæca* Cuvier, Régne Anim., 2 ed., II, p. 73 (type locality said to be Martinique, but probably erroneously).—Duméril and Bibron, Erpét. Gén., V, 1839, p. 492 (Martinique).—Duméril, Cat. Méth. Rept. Mus., Paris, I, 1851, p. 148 (Martinique).—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 708 (Porto Rico); 1878, p. 781, pl. fig. 4 (Martinique).—Gundlach, Añal. Soc. Españ. Hist. Nat., X, 1881, p. 312 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 70, 160 (Porto Rico).—Strauch, Mél. Biol. Acad. Sci. St. Pétersb., XI, 1883, p. 405 (Martinique).—Boulenger, Proc. Zool. Soc. London, 1890, p. 79 (Porto Rico).

A number of names cluster around the original *Amphisbæna cæca*, described from a specimen said to have come from Martinique. Specimens have been mentioned and described from various localities in the West Indies or even in South America,[b] namely, from the alleged type locality as given above, the Virgin Islands, Porto Rico, Haiti, and Cuba. Some of these have received separate names, such as *A. fenestrata* from the Virgin Islands, *A. innocens* from Haiti, and *A. cubana* from Cuba. The characters assigned to the first and last of these are such that they have been recognized by most writers as distinct species, though it should be mentioned that Boulenger has expressed the opinion that the fusion of the ocular with the second supralabial in both type specimens of *A. cubana* (the only ones known at the time he wrote) may be an individual anomaly. This is not likely, however, as the U. S. National Museum has recently received two specimens from Matanzas, Cuba (Nos. 26363 and 26364), which in the relation of oculars and second supralabial agree minutely with the types. More specimens of *A. fenestrata* than of all the other West Indian species have reached the museums, and it seems that all those recorded from the Virgin Islands, with one exception, to be mentioned further on, agree in having the rostral produced so far backward as to completely separate the nasals from each other, a peculiarity thus far not observed in any specimen of this group from any other locality. The exception alluded to above is a specimen in the Paris Museum, mentioned by Strauch[c] and alleged to be from St. Thomas, having been obtained from the Copenhagen Museum. It is possible that there is a mistake about the locality, for it is not likely that Reinhardt and Luetken, in describing *A. antillensis* (= *fenestrata*), should have overlooked this specimen. On the other hand, the Copenhagen Museum may have received it since the

[a] Latin=blind.

[b] Thus Boulenger's *Amphisbæna cæca* (Cat. Liz. Brit. Mus., II, 1885, p. 445), from Porto Bello, probably in Brazil, has later on been recognized by himself as not belonging to Cuvier's species, and is stated to be the same as Boulenger's *Amphisbæna ridleyi*, from Fernando Noronha.

[c] Mél. Biol., XI, 1883, p. 406.

publication of their paper on the herpetology of the West Indian islands, in which case considerable doubt is thrown on the stability of the chief character relied upon for the distinction of the Virgin Islands species, as it is improbable that Reinhardt or Luetken would have parted with the specimen now in Paris if it were unique. The suggestion that it is only an abnormal *A. fenestrata*, however, is strengthened by the number of body rings, which is said to be 247.

Amphisbæna innocens from Haiti has been pronounced an unqualified synonym of *A. cæca* by such authorities as Peters[a] and Strauch,[b] both of whom had the opportunity of comparing the types of both species. Reluctant as I am to question their conclusion without having examined the same material, I would call attention to the small number of body rings in the Haitian specimens, 211–215, and to the occurrence of only two small scutes behind the unpaired postmental instead of three. Moreover, a specimen in the U. S. National Museum (No. 10168) from the Island de la Gonaives, off Port au Prince, Haiti, consequently not very far from the type locality of *A. innocens*, shows these same characters (211 body rings, 13 caudal rings). In addition it has 18 segments above the lateral line and 24 below it. Another Haitian specimen (Hamburg Museum, No. 1983) is recorded by Meerwarth as having 211 body rings and 14 caudal rings; it has 16 segments above the lateral line and 21 below. Consequently it agrees closely with the others and differs in all these points from true *A. cæca*.

The whole question hinges essentially on the amount of individual variation to be found in specimens from the same locality. Unfortunately, not only is the number of specimens from each locality very limited, but not all the specimens known to exist have been described individually with sufficient details. The only minutiæ given for nearly all the specimens are the number of rings on the body and tail. If we place these figures together it will be seen that in the specimens hitherto recorded there is a certain uniformity in those from each locality, with a perceptible difference according to the various localities, as follows:

Martinique (?) specimens (*A. cæca*), 227–230 body rings; 18 on tail.

Virgin Islands specimens (*A. fenestrata*), 242–250 body rings; 13–16 on tail.

Haitian specimens (*A. innocens*), 211–215 body rings; 13–15 on tail.

That we have not to do with a curious coincidence only, due in a measure to the scantness of the material, seems certain from a consideration of the specimens from the Virgin Islands and from Porto Rico. Specimens from the former islands are more common in museums than the other species, about 10 being recorded in some detail, including the one St. Thomas specimen in the Paris Museum

[a] Mon. Ber. Berlin Akad. Wiss., 1878, p. 781.

[b] Mél. Biol., XI, 1883, p. 405.

referred to *A. cæca* by Strauch and mentioned above. In addition I have before me a specimen (U.S.N.M. No. 11715) from St. John, probably one of the types of *A. fenestrata*. In all these 11 specimens the body rings vary only between 242 and 250 and the caudal rings between 13 and 16. I may further add that our specimen agrees exactly with the other details recorded by Boulenger in his description of the 3 specimens in the British Museum, namely, 2 temporals, 4 to 6 preanals, 12 to 14 segments above the lateral line and 14 below in a ring around the middle of the body. Finally, Reinhardt and Luetken mention one temporal (or postocular) as an exception. Even if we include the so-called *A. cæca* from St. Thomas as an abnormal specimen, having the nasals contiguous behind the rostral, it will be seen that in this series of 11 specimens the individual variation is but very slight. This result tallies exactly with that obtained from an examination of 19 Porto Rican specimens of one species, the largest series yet compared anywhere, showing that these animals exhibit a most unexpected small variability in certain characters contrary to what was formerly believed to be the case.

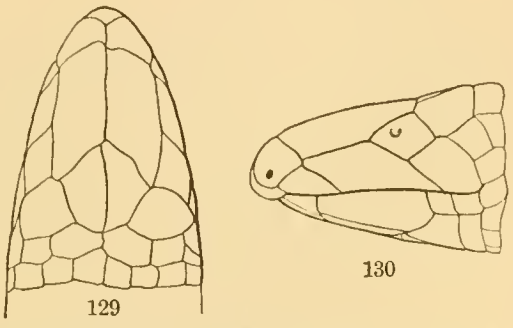
An examination of the five specimens of *Amphisbæna* collected at Lares by Mr. Baker shows that they fall into two groups. The first, consisting of three specimens, has 221 to 230 body rings and 17 to 19 rings on the tail; 1 postocular + 1 temporal; nasal suture short, not longer than portion of rostral visible from above, or entirely lacking, the rostral in one specimen being barely in contact with one of the prefrontals; color, darker. In the other group of two specimens the rings on the body are 249 and 251 and on the tail 16; a single postocular and no temporal; long nasal suture, it being about three times longer than the portion of the rostral visible from above; color, paler. Preanals, number of segments around the body, and postmental scutes nearly alike in both groups.

The fact that these specimens were collected in the same locality, and the evident close relationship of the two groups, at first suggested that we had to deal with a rather extreme case of individual variation. On the other hand, the correlation of such a great number of characters with no indication of intergradation, viewed in the light of the conclusions arrived at from a study of the forms collected in the other islands, convinced me of the specific distinctness of the two groups of specimens.

This conclusion, which I had arrived at before my visit to Porto Rico, was amply sustained by the material brought home by me or received since my return. This material consists of 17 additional specimens, 16 of which belong to the group having a short nasal suture, 1 temporal, and 220 to 230 body rings, while the seventeenth specimen is as typical of the other group, having a long nasal suture, no temporal, and 250 body rings.

Comparing the first group with the recorded characters of allied species, it will be found to agree very well with those of *A. cæca*, which has 227 to 230 body rings, 18 caudal rings, 1 temporal, 6 preanals, 3 scutes behind the unpaired postmental, and short nasal suture.[a]

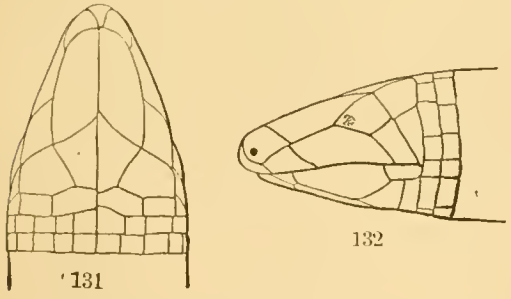
The fact that the types of *A. cæca* are said to have been collected in Martinique is of no moment whatever, and it is pretty safe to say that the species does not occur there. It is now known that Plée, who sent these specimens to the Paris Museum, collected in Porto Rico, on his way to Martinique, whence he shipped his material to Paris.



FIGS. 129–130.—AMPHISBÆNA CÆCA. 3½ × natural size. 129, top of head; 130, side of head. No. 27223, U.S.N.M.

The three other specimens mentioned above I can not unite with any other known form, and they will be described further on under a new name.

Description.—*Adult;* U.S.N.M., No. 27223; Utuado; April 10, 1900. Rostral small, triangular, the portion visible from above short, about equaling the suture between the nasals; prefrontals very long, the suture between them longer than the one between the frontals and five times as long as the nasal suture; ocular moderate, quadrangular, smaller than the postocular and the third supralabial; in the angle shields a well-developed temporal, between and behind the latter two only slightly smaller than the ocular; eye plainly visible through ocular; a pair of occipitals, broader than long, in contact behind the frontals; three supralabials, the second as long as the other two together; three lower labials, the second longer than the other two together; mental followed by a large median postmental, twice as long as broad; behind the second lower labial a large malar shield; just behind the postmental and between the malars three scales in a transverse row (postgeneials); 226 rings on the body and 17 on the tail; the segments of each ring longer than broad on the back, broader than long on the under side, 16 above and 18 below the lateral line; anal shields, 6; preanal pores, 4. Color, flesh color, with



FIGS. 131–132.—AMPHISBÆNA CÆCA. 2½ × natural size. 131, top of head; 132, side of head. No. 25540, U.S.N.M.

[a] Characters derived from Duméril and Bibron's original description, Strauch's notes upon the types, and Peters's figure of one of the types (Mon. Ber. Berlin Akad. Wiss., 1878, plate facing p. 781, fig. 7).

a squarish brown spot, darkest on the back, occupying the middle of each segment, these spots being absent on many of the ventral segments of the posterior half of the body; top of head uniform brownish, except rostral and nasals, which are colorless.

Dimensions.

	mm.
Tip of snout to vent	185
Tail	16
Diameter of body	7

Variation.—The amount of variation in the large series of 19 specimens before me is rather insignificant and affects chiefly the arrangement of the occipitals. They are always broader than long, but they are in contact behind the frontal as often as they are separated. One specimen (No. 25540) is rather more aberrant, inasmuch as the rostral is elongated backward somewhat unsymmetrically so as to touch the right prefrontal and thus prevent the contact between the nasals. In this specimen the temporal is also prolonged downward so as to touch the corner of the mouth with its lowest point. The number of rings varies only between 220 and 230 in a series of at least 20 specimens; the dorsal segments vary between 14 and 16, and the ventral segments between 16 and 18. The number of postgenecials is invariably 3, of anal shields 6.

Habitat.—The true *Amphisbæna cæca* has thus far only been found in Porto Rico, where it seems to inhabit the lowlands and the mountain sides, possibly as high up as 1,000 feet altitude. In the eastern end of the island we collected it on the Catalina plantation, on the northern flank of El Yunque, at an altitude of about 890 feet, while in the west Mr. Baker obtained it at Lares. Mr. J. Michaelis, in 1900, sent a specimen to the Hamburg Museum from Arecibo. We found it under stones, burrowing like earthworms, or in ants' nests.

List of specimens of Amphisbæna cæca examined.

U. S. N. M. No.	Locality.	When collected.	By whom collected.	Number of rings on body.	Rings on tail.	Dorsal segments.	Ventral segments.	Postgenecials.	Anals.	Preanal pores.
25538	Lares	Jan. 26, 1899	A. B. Baker	230	19	16	18	3	6	4
25539	do	do	do	221	17	16	18	3	6	4
25540	do	do	do	228	19	16	18	3	6	4
26879	Catalina plantation	Feb. 21, 1900	L. Stejneger	230	17	14	16	3	6	4
26880	do	do	do	229	17	14	16	3	6	4
26881	do	do	do	224	16	14	16	3	6	4
26882	do	do	do	230	17	14	16	3	6	4
27002	Luquillo	Mar. 7, 1900	C. W. Richmond	221	16	14	16	3	6	4
27003	do	do	do	227	17	16	18	3	6	4

List of specimens of Amphisbæna cæca examined—Continued.

U. S. N. M. No.	Locality.	When collected.	By whom collected.	Number of rings on body.	Rings on tail.	Dorsal segments.	Ventral segments.	Postgenecials.	Anals.	Preanal pores.
27004	Luquillo	Mar. 7, 1900	C. W. Richmond	221	17	14	16	3	6	4
27005	do	Mar. 5, 1900	do	227	16	16	18	3	6	4
27006	do	do	L. Stejneger	226	17	16	18	3	6	4
27223	Utuado	Apr. 10, 1900	do	226	17	16	18	3	6	4
27319	Bayamon	———, 1900	A. Stahl	220	16	16	16	3	6	4
27320	do	———, 1900	do	220	17	16	18	3	6	4
27321	do	———, 1900	do	229	17	16	18	3	6	4
27322	do	———, 1900	do	225	16	16	18	3	6	4
27459	Porto Rico	———, 1900	Chas. E. Adams	229	17	14	16	3	6	4
30907	Bayamon	Jan. 14, 1899	Aug. Busck	225	16	16	18	3	6	4

AMPHISBÆNA BAKERI,[a] new species.

Diagnosis.—Nasals forming a long suture on the snout, more than twice longer than portion of rostral visible from above, and about one-half the prefrontal suture; four anal pores; two prefrontals; no temporal; 32–34 segments in a ring on the middle of the body; about 250 rings on the body; 6 anals; ocular forming suture with second and third supralabials; 3 small scutes (postgenecials) behind unpaired postmental.

Type.—U. S. N. M., No. 25541; Lares, Porto Rico; A. B. Baker, collector.

Habitat.—Porto Rico, West Indies.

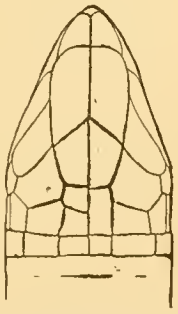


FIG. 133.—AMPHISBÆNA BAKERI. 2½ × natural size. Top of head. No. 25541, U.S.N.M.

Description of type specimen.—Adult; U. S. N. M., No. 25541; Lares; January 26, 1899. Rostral small, triangular, the portion visible from above short, nearly one-third the suture between the nasals; prefrontals long, the suture between them slightly longer than the one between the frontals and but slightly more than twice the nasal suture; ocular moderate, quadrangular, the anterior angle very long and pointed; eye not visible; a pair of occipitals, longer than broad (the one on the left side abnormally divided), broadly in contact behind the frontals; three supralabials, the second longer than the other two together; three lower labials, the second longer than the other two together; mental followed by a large median postmental, much longer than broad; behind the second lower labial a large triangular malar shield; behind the postmental and between the malars 3 scales in a trans-

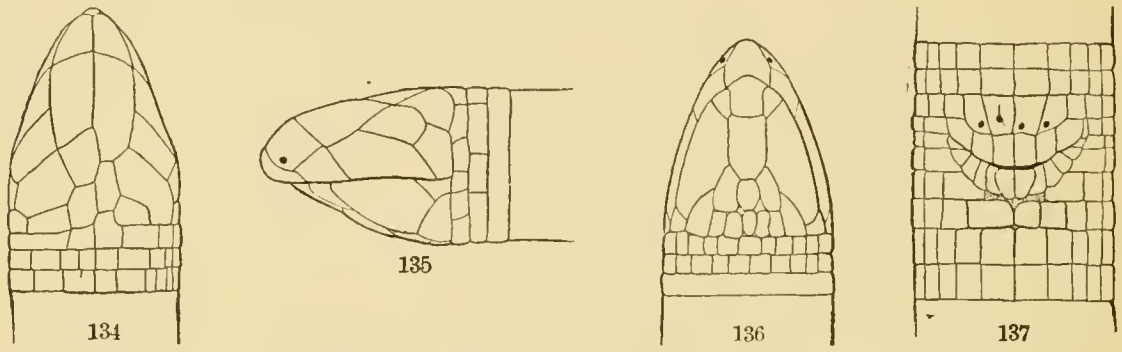
[a] To Mr. A. B. Baker, who collected the type specimen, in recognition of the splendid material he brought home from the U. S. Fish Commission steamer *Fish Hawk* expedition to Porto Rico.

verse row (postgenеials); 249 rings on the body and 16 on the tail; the segments square, slightly longer than broad on the back, the 6 median rows on the abdomen broader than long, especially the middle pair; 16 above and 16 below the lateral line; anal shields or segments, 6; preanal pores, 4. Color light flesh, with a brownish spot in the center of each segment, rather indistinct, especially on the lower surface.

Dimensions.

	mm.
Tip of snout to vent	260
Tail	18
Diameter of body	9

Variation.—Apart from a slight oscillation in the relative length of the sutures on the head the variability is insignificant. As in *A. cæca*, the occipitals appear most subject to variation, but they seem to be longer than broad, as a rule, even in the clearly abnormal specimen (No. 25537) as shown in fig. 134. The number of rings varies only



FIGS. 134-137.—AMPHISBÆNA BAKERI. 2½ × natural size. 134, top of head; 135, side of head; 136, underside of head; 137, anal region. No. 25537, U. S. N. M.

between 249 and 251 in the three specimens at hand, but more specimens will undoubtedly show a greater range, though probably not more than a difference of ten, as in *A. cæca*.

The ventral segments vary between 16 and 18 in our specimens, but otherwise the scale formula is constant. The eye is plainly visible in No. 27458.

Habitat.—Apparently confined to Porto Rico. The only definite locality whence we have specimens is Lares, where Mr. A. B. Baker collected two specimens. A third one was sent by Mr. Charles E. Adams from Porto Rico without any record as to the place where it was actually taken.

Remarks.—In addition to the characters pointed out in the key and diagnosis, this interesting novelty differs from *A. cæca* in several other points, the constancy of which, however, must remain doubtful till more specimens can be examined. Such are the elongation and broad contact of the occipitals and the lighter color, but the other characters, as demonstrated by the great uniformity in the large series of *A. cæca*, are sufficient to distinguish *A. bakeri*.

List of specimens of Amphisbæna bakeri examined.

U.S. N.M. No.	Locality.	When collected.	By whom collected.	Number of rings on body.	Rings on tail.	Dorsal segments.	Ventral segments.	Postgenecials.	Anals.	Preanal pores.
25537	Lares	Jan. 26, 1899	A. B. Baker	251	16	16	16	3	6	4
25541[a]	do	do	do	249	16	16	16	3	6	4
27458	Porto Rico	——, 1900	Chas. E. Adams	250	17	16	18	3	6	4

[a] Type.

Suborder SERPENTES.

The snakes are but poorly represented in Porto Rico, both as to species and, at present at least, as to individuals. None of the poisonous forms, whether Crotalidæ or Elapidæ, are found, not even one of the "suspects" or opistoglyphs. The four genera which occur belong to no less than three families. They may be told apart by the following artificial

KEY TO THE PORTO RICAN SNAKES.

a^1 Underside of body covered with small scales like the back (*Typhlopidæ*) ..... *Typhlops*, p. 683.

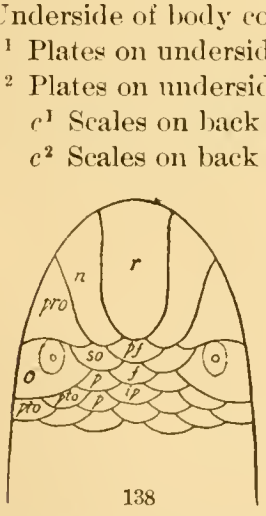
a^2 Underside of body covered with transverse plates.

b^1 Plates on underside of tail undivided (*Boidæ*) ..... *Epicrates*, p. 688.

b^2 Plates on underside of tail in pairs (*Coronellidæ*).

c^1 Scales on back with one pore near the tip or none.... *Leimadophis*, p. 694.

c^2 Scales on back with two pores ..... *Alsophis*, p. 699.



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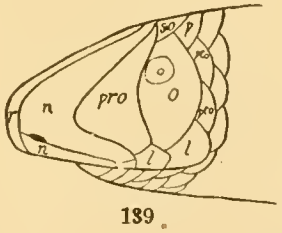

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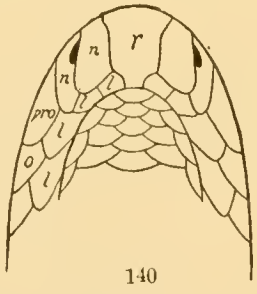

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FIGS. 138–140.—HEAD SHIELDS OF TYPHLOPS. *f*, frontal; *ip*, interparietal; *l*, supralabials; *n*, nasal; *o*, ocular; *p*, parietals; *pf*, prefrontal; *pro*, preocular; *pto*, postocular; *r*, rostral; *so*, supraocular.

Genus TYPHLOPS[a] Oppel.

1811. *Typhlops* OPPEL, Ordn. Rept., p. 54 (type *T. lumbricalis*).

1844. *Ophthalmidion* DUMÉRIL and BIBRON, Erpét. Gén., VI, p. 262 (type *O. longissimum*).

1845. *Anilios* GRAY, Cat. Liz. Brit. Mus., p. 135 (type *A. australis;* not *Anilius* OKEN, 1816).

1845. *Meditoria* GRAY, Cat. Liz. Brit. Mus., p. 139 (type *T. nasutus*).

[a] τῦφλός, blind; ὤψ, eye.

The blind-snakes are small burrowing snakes, smooth and nearly cylindrical, and covered with rounded imbricate scales of nearly uniform size and shape both above and below; only a few shields covering the anterior portion of the head are clearly differentiated from the rest. The eye is concealed under a large shield and may be shining through as a blackish spot or be entirely invisible. They have teeth only in the upper jaw, and there is no enlarged preanal shield.

At the first glance they resemble earthworms, and like these animals they live underground in self-made burrows.

Two species of blind-snakes occur in Porto Rico, one of which is here described as new. They may be distinguished as follows:

a^1 Rostral moderate, one-third to one-fourth the width of the head; brown above, whitish below; twenty to twenty-two scale rows..... *T. lumbricalis*, p. 684

a^2 Rostral very narrow, one-fifth to one-sixth the width of the head; uniform brown above and below with an abrupt whitish spot on the underside of the snout and another on the underside of the tail; eighteen to twenty scale rows.... *T. rostellatus*, p. 686

TYPHLOPS LUMBRICALIS[a] (Linnæus).

1758. *Anguis lumbricalis* Linnæus, Syst. Nat., 10th ed., I, p. 228 (type locality, America).—*Typhlops l.* Oppel, Ordn. Rept., 1811, p. 55.—Duméril and Bibron, Erpét. Gén., VI, 1844, p. 287 (Martinique, Guadeloupe, Cuba).—Jan, Icon. Ophid., livr. 3, 1864, pls. iv, v, fig. 4.—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 708 (Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 312 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 70, 160 (Puerto Rico).—Boulenger, Cat. Sn. Brit. Mus., I, 1893, p. 31 (Jamaica, Cuba, St. Thomas, Antigua), III, 1896, p. 585.—Verrill, Trans. Connecticut Acad. Sci., VIII, April, 1892, p. 351; author's separate p. 37 (Dominica) (or may be *platycephalus??*).—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 5 (St. Thomas, Haiti, Mona Island).

1802. *Anguis jamaicensis* Shaw, Gen. Zool., III, p. 588 (type locality, Jamaica).

1830. *Typhlops cinereus* Guérin, Icon. Règne Anim., Rept., pl. xviii, fig. 2 (Guadeloupe) (not of Schneider, 1801).

1840. *Typhlops cubæ* Bibron, in Sagra's Hist. Fis. Pol. Nat., IV, Rept., p. 122, pl. xxii; French ed. (p. 204) (type locality, Cuba).

1844. *Typhlops richardii* Duméril and Bibron, Erpét. Gén., VI, p. 290 (type locality, St. Thomas).—Duméril, Cat. Méth. Rept. Mus. Paris, 1851, p. 205 (St. Thomas, Cuba, Porto Rico).—Reinhardt and Luetken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862 (1863), p. 164; author's separate p. 12 (Virgin Islands).—Jan, Icon. Ophid., livr. 3, 1864, pls. iv, v, fig. 7.—Garman, Proc. Amer. Philos. Soc., XXIV, 1887, p. 278 (St. Kitts).

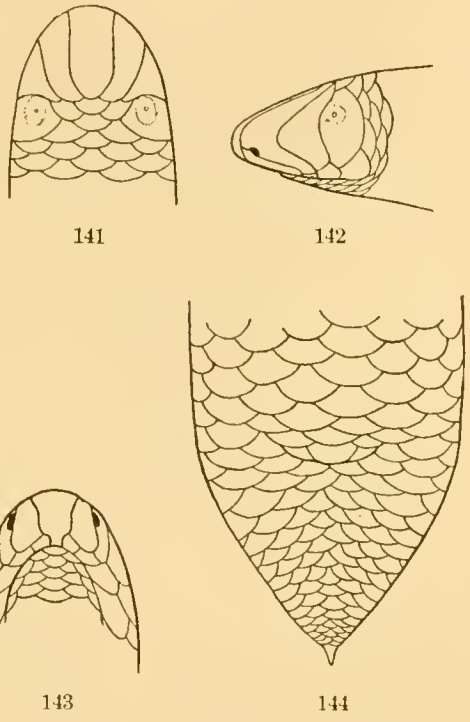
Description.—Adult; U.S.N.M. No. 27489; Aguadilla; July 28, 1900. Head rather depressed, snout strongly projecting, rounded laterally; nostrils slightly below the lateral horizontal edge; rostral about two-sevenths the width of the head (1:3.5), extending backward to a line drawn between the anterior edge of the eyes; nostril on a

[a] Resembling an earthworm, lumbricus.

suture starting from the middle of the upper edge of the second supralabial and joining the rostral suture at the lateral horizontal edge, the lower anterior nasal thus being in contact with first and second supralabial and the upper posterior one in contact with the second and third; preocular large, as wide as the ocular, in contact with third labial; ocular with but slightly convex anterior edge, in contact with third and fourth supralabials; supraoculars, prefrontal, frontal, postoculars, and parietals scale like, subequal; eye distinctly visible; 20 scale rows round the body; about 360 scales on the middle line of the body underneath from chin to vent and 11 under the tail; tail ending in a spine. Color above brown, each scale being dark brown on the termal two-thirds, the base being abruptly pale; on the smaller head scales this color pattern does not exactly correspond to the individual scales, and the large head shields are brown, with pale edges; underside whitish, the dividing line between the color of the upper and lower surfaces being very irregular, with an angular projection of the white color into the brown on the side at the level of the vent.

Dimensions.

	mm.
Tip of snout to vent	278
Vent to tip of tail	6
Diameter of body	9



141 142 143 144

FIGS. 141-144.—TYPHLOPS LUMBRICALIS. 3½ × natural size. 141, top of head; 142, side of head; 143, underside of head; 144, anal region and underside of tail. No. 27489, U.S.N.M.

Variation.—The individual variation in scutellation and color is but slight. The number of scale rows in six specimens from Porto Rico and Mona is 20; in 2 (U.S.N.M. Nos. 29198 and 30908) it is 22. The color of one of the specimens from Mona Island in the Hamburg Museum (No. 1582), examined by me in August, 1901, was nearly uniform whitish, having the appearance of an albino.

Habitat.—The true *Typhlops lumbricalis* extends from South America into nearly all the Antillean islands. Thus, it is recorded from Martinique, Guadeloupe, Dominica, St. Kitts, Antigua, the Virgin Islands, Porto Rico, Mona, Haiti, Cuba, and Jamaica.

In Porto Rico it has thus far been found only in the low land, not far above sea level. There are two specimens in the Hamburg Museum from Mona Island, collected by Mr. Bock in 1891 and 1894.

List of specimens of Typhlops lumbricalis.

U.S. N.M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Scale.	Remarks.
25779	.....	Bayamon, Porto Rico.	Jan. 15, 1899	A. B. Baker.....	20	
27324	.....	.....do.....	.....	A. Stahl.....	20	
27489	.....	Aguadilla, Porto Rico.	July 28, 1900	B. S. Bowdish.....	20	Specimen figs. 141–144, and described, p. 684.
29198	.....	Mayaguez, Porto Rico.	—— —, 1901	.....do.....	22	
29364	.....	.....do.....	Sept. 16, 1901	.....do.....	20	
30908	Young..	Bayamon, Porto Rico.	Jan. 14, 1899	Augustus Busck....	22	

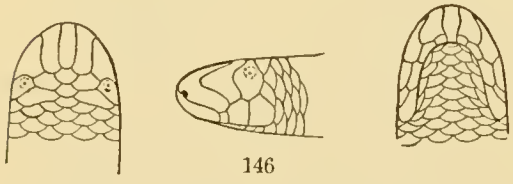
TYPHLOPS ROSTELLATUS,[a] new species.

Diagnosis.—Snout rounded; nostrils lateral; preocular in contact with third labial only; nasal completely divided in two; two postoculars; rostral very narrow, one-fifth to one-sixth the width of the head; 18–20 scale rows.

Type.—U.S.N.M. No. 25463; Lares, Porto Rico; A. B. Baker, collector.

Habitat.—Porto Rico, West Indies.

Description of type specimen.—Adult; U.S.N.M. No. 25463; Lares; January 26, 1899. Head blunt, not depressed, snout projecting, rounded laterally; nostrils lateral; rostral narrow, about one-sixth the width of the head (1:6.4), not extending as far back as a line between the anterior edge of the eyes; nostril on a suture completely dividing the nasal, the lower anterior part in contact with first and second, the upper posterior nasal in contact with second and third; preocular wider than ocular, its anterior angle much produced and rather acute, in contact with third supralabial only; ocular with the anterior border strongly convex, in contact with third and fourth supralabials; supralabials four, the posterior two large and reaching high up on the side; prefrontal, frontal, and interparietal scale-like, subequal; supraoculars and parietals enlarged, especially the latter; eye distinctly visible; 18 scale rows round the body; about 333 scales on the middle line of the body underneath from chin to vent, and 13 under tail; tail ending in a spine. Color uniform dark brown, slightly paler underneath; through the dark ground color a distinct blackish network can



145 146 147

FIGS. 145–147.—TYPHLOPS ROSTELLATUS. 3½ × natural size. 145, top of head; 146, side of head; 147, underside of head.

[a] With reference to the narrowness of the rostral shield.

be traced, the meshes of which anteriorly coincide with the outline of the scales, but becoming more and more discordant posteriorly; rostral and anterior nasal brown above, margined with whitish, underneath whitish; a very abrupt whitish spot occupying the anal region and the under side of the tail.

Dimensions.

	mm.
Tip of snout to vent	197
Vent to tip of tail	3
Diameter of body	5

Variation.—The individual variation appears to be similar in character and extent to that indicated for *Typhlops lumbricalis*. Three of our specimens have 18 scale rows, the fourth has 20.

Habitat.—Thus far the only definite locality whence we have received this species is Lares, in the western part of Porto Rico. In this place Mr. A. B. Baker obtained three specimens. A fourth was sent from Porto Rico by Mr. Charles E. Adams, but without indication of the exact locality where he collected it.

Remarks.—This interesting novelty resembles in color closely the specimens which Boulenger has described from Dominica under the name of *Typhlops platycephalus*. The latter differ, however, by having 24 scale rows around the body and by a much wider rostral which is said to be one-third the width of the head. Duméril and Bibron's *Typhlops platycephalus*, which is said to have come from Martinique, collected by Plée, must be a very different one from the Dominica species. It is described as having 20 scale rows and it might consequently be suspected to be the same as our Porto Rican species, but apart from the radically different coloration, the true *T. platycephalus* is described as having the head more depressed than *T. lumbricalis* and the posterior supralabials much lower, while, as we have seen, two of the best characters of our new *T. rostellatus* are the lack of depression in the profile of the head and the unusual height of the posterior supralabials.

Boulenger's *T. platycephalus*[a] is apparently different from that of Duméril and Bibron and may be appropriately named *Typhlops dominicana*, from the island of Dominica, of which it is a native.

List of specimens of Typhlops rostellatus.

U.S. N.M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Scale rows.	Remarks.
25463	.....	Lares, Porto Rico...	Jan. 26, 1899	A. B. Baker.....	18	Type.
25462	.....	.....do.....	.....do.....	.....do.....	20	
25461	.....	.....do.....	.....do.....	.....do.....	18	
27460	.....	Porto Rico.....	——, 1900	Chas. E. Adams	18	

[a] Cat. Sn. Brit. Mus., 1, 1893, p. 30.

Genus EPICRATES.[a] Wagler.

1830. *Epicrates* Wagler, Nat. Syst. Amph., p. 168 (type *B. cenchria*).
1844. *Chilabothrus* Duméril and Bibron, Erpét. Gén., VI, p. 562 (type *Ch. inornatus*).
1849. *Cliftia* Gray, Cat. Sn Brit. Mus., p. 99 (type *C. fusca*=*E. cenchria*).
1856. *Epicarsius* Fischer, Abh. Naturw. Ver. Hamburg, III, p. 94, (type *E. cupreus*=*E. cenchria*).
1856. *Homalochilus* Fischer, Abh. Naturw. Ver. Hamburg, III, p. 100 (type *H. striatus*).
1881. *Piesigaster* Seoane, Abh. Senckenberg. Naturf. Gesellsch., XII (p. 217); author's separate, p. 1 (type *P. boettgeri*=*E. inornatus*).
1881. *Chilobothrus* Gundlach, Anal. Soc. Españ. Hist. Nat., X, p. 312 (*emend.*)

The snakes of this genus belong to the Boid family, characterized, among other things, by the vestiges of posterior limbs, which are often visible on the sides of the vent as small, claw-like appendages. The Boas, as a rule, have undivided subcaudal shields and are mostly inhabitants of the New World. They are not poisonous, but kill their prey by squeezing it to death.

Two species occur within the territory covered by this report, one in Porto Rico proper, the other in Mona Island, both related to species inhabiting other islands of the Greater Antilles and the Bahamas.

The two species may be distinguished as follows:

a^1 Supraoculars about one-third as broad as frontal.....*E. inornatus*, p. 688
a^2 Supraoculars about one-half as broad as frontal.....*E. monensis*, p. 692

EPICRATES INORNATUS[b] (Reinhardt).

1843. *Boa inornata* Reinhardt, Danske Vidensk. Selsk. Afhandl., X, p. 253; author's separate, p. 21, pl. 1, figs. 21–23 (type locality, Porto Rico; types in Mus., Copenhagen; Dr. Ravn, coll.).—*Chilabothrus inornatus* Jan, Icon. Ophid., livr. 6, 1864, pl. v, fig. B.—Cope, Proc. Phila. Acad., 1868, p. 312 (Porto Rico).—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 708 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 70, 126, 160 (Porto Rico).—Garman, N. Amer. Rept., I, Ophid., 1883, p. 132 (Porto Rico); Proc. Amer. Philos. Soc., XXIV, 1887, p. 279 (Bayamon, Porto Rico).—*Chilobothrus i.* Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 312 (Porto Rico).—*Epicrates inornatus* Stejneger, Proc. U. S. Nat. Mus., XXIII, No. 1218, 1901, p. 470 (Porto Rico).
1881. *Piesigaster boettgeri* Seoane, Abh. Senckenberg. Naturf. Gesellsch., XII (p. 218); author's separate, p. 2, pl. 1 (type locality, Mindanao, Philippine Islands!!).

On a previous occasion[c] I separated the Jamaican species which for more than fifty years was considered identical with *E. inornatus* as *E. subflavus*. For the distinguishing characters it must suffice to refer to the paper in question, but it may be advisable to say here that

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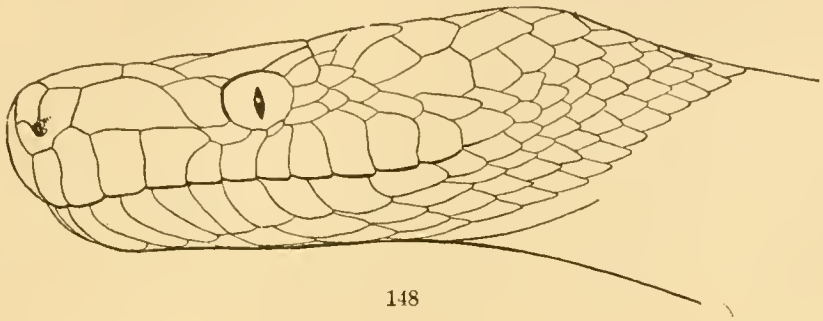
[a] ἐπικρατής, powerful.
[b] Latin—Unadorned.
[c] Proc. U. S. Nat. Mus., XXIII, 1901, pp. 469–470.

Scoane's figure of *Piesigaster boettgeri* shows it to be based upon Porto Rican specimens (undivided prenasal; divided posterior prefrontals; irregular parietals) which is likely enough since they were collected by his brother, an officer in the Spanish navy. The young specimen figured by Jan (fig. B) is undoubtedly also from Porto Rico.



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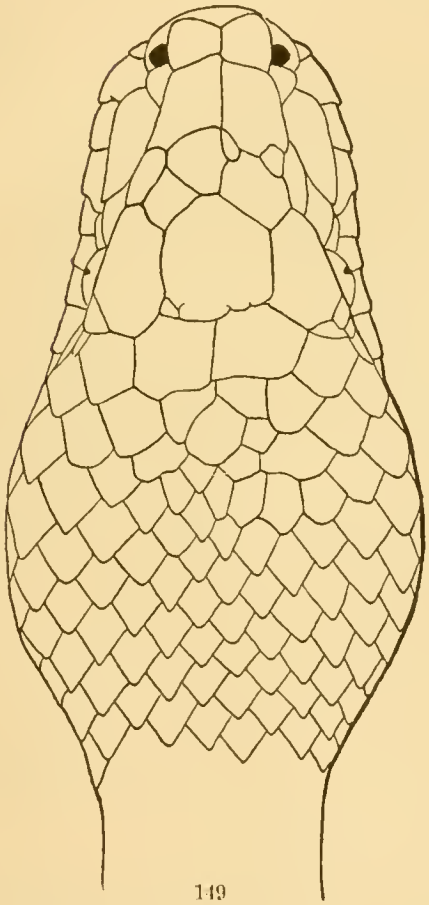

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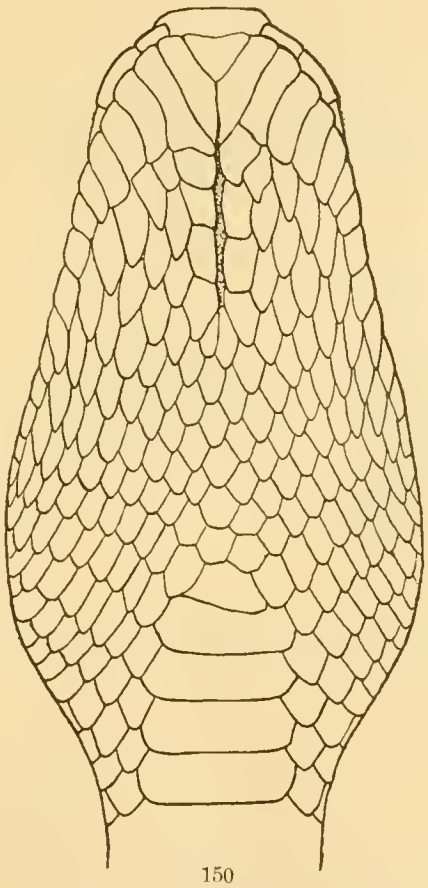

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FIGS. 148–150.—EPICRATES INORNATUS, adult. Natural size. 148, side of head; 149, top of head; 150, underside of head. No. 27734, U.S.N.M.

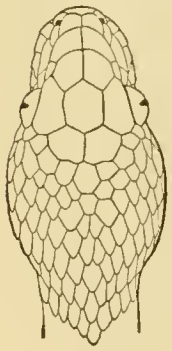
Description.—Adult male; U.S.N.M. No. 27734; Caguas; Capt. C. G. Stevenson, collector. Rostral much broader than high; visible from above; internasals as broad as long, broadly in contact; anterior prefrontals long; posterior prefrontals (abnormally and unsymmetrically) broken up, separated from the loreal and preocular by a small canthal shield; frontal large, irregularly hexagonal, longer than broad, nearly one and a half times as broad as supraoculars; parietals in con-

tact, small, slightly broader than long, about twice as large as the adjoining shield on each side just behind the supraocular; nasal divided, in contact with first and second supralabials; loreal long, twice as long as high, in contact with nasal, anterior prefrontals, small canthal shield, preocular, and second, third, and fourth supralabials; two preoculars, the upper much the larger and with the upper posterior angle between eye and supraocular (abnormally) detached; sixth supralabial only reaching eye, the seventh being separated from the eye by the lower postocular; twelve supralabials; no labial pits; four postoculars, the lower one on the left side with the anterior portion (abnormally) detached; anterior temporals small, scalelike, followed by several larger shields; scales in 39 rows round the body; ventrals 265; anal entire; subcaudals 57 (tail probably mutilated).

Dimensions.

	mm.
Snout to tip of tail	1,900
Vent to tip of tail	230

Variation.—There is considerable variation in the head shields, mostly due, however, to the breaking up of the individual scales than to their original difference in shape and proportions. The only young specimen examined by me (No. 12446) appears the most normal and is consequently figured here (figs. 151–152). The scutellation of the others can readily be referred to this model. The nasal is often undivided, possibly oftener so than divided. The scale rows round the body vary between 38 and 42, ventrals (in 12 specimens) between 261 and 271, and caudals between 67 and 75 when tail is not defective. Specimens with 36–57 caudals have probably lost the tip of the tail by accident.



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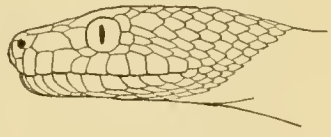

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FIGS. 151–152.—EPICRATES INORNATUS, young. Natural size. 151, top of head; 152, side of head; No. 12446, U.S.N.M.

Color of live specimens.—U.S.N.M. No. 27734, adult male (died in National Zoological Park, August 20, 1900).—Nearly uniform "bistre"[a] with ventrals and subcaudals darker, narrowly pale-edged behind; above numerous indistinct cross bars (70–80 from neck to vent) of dusky color with one or two scales nearly black, thus emphasizing the spots, of which all the component rows (dorsal, dorsolateral, lateral and ventrolateral) are recognizable; the crossbars increase in width posteriorly; a blackish postocular band indistinctly connected with a medio-lateral faint longitudinal line on the neck; supralabials fading

[a] Ridgway, Nomencl. Col., pl. III, fig. 6.

into pale brownish gray at the commissure; slight traces of rufous on rostral and other shields of face; iris silvery gray clouded with dusky.

No. 29583 a somewhat smaller individual (1,500 mm. total length) brought home by Mr. Bowdish is very similar in coloration, only the underside is more slate color, and the pattern much more distinct, the crossbars showing paler centers with blackish margins; the spots of the lateral series show a tendency to form a lateral blackish line on the anterior third of the body.

No. 27456 (1,590 mm. long), collected by Captain Hansard, died at the National Zoological Park on July 6, 1900, showed hardly any traces of bars or spots; general color above, chestnut, darkest on the median region and tail, gradually becoming lighter toward the ventrals; the latter brownish-slate color with pale edges; throat and chin mottled dull rufous and brownish slate; scattered obscure dusky spots on flanks.

Habitat.—This large snake is confined to Porto Rico, where it is found in wooded and rocky places of the foothills. It is now getting to be rather rare, so much so that neither the *Fishhawk* parties, Mr. Baker, Dr. Richmond, nor myself saw one during our explorations. Mr. Baker, however, saw the trail of them in the grass.

E. inornatus has been recorded unqualifiedly from Haiti by Bocourt upon the strength of a specimen in the Paris Museum. He gives no particulars, however, but there can be no doubt that it is the same specimen briefly described by Duméril[a] as showing some peculiarities in the cephalic scutellation as well as a very aberrant coloration. Duméril himself seems strongly inclined to regard it as belonging to a different species, and to me it appears quite possible that the specimen in question may be a young *E. fordii*.

Zenneck[b] gives Cuba as one of the localities of *Epicrates inornatus* and cites Bibron[c] as authority, but I have been unable to find any such reference. As a matter of fact, Bibron's work was published before Reinhardt described *E. inornatus*.

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[a] Cat. Méth. Rept. Mus., Paris, 1851, p. 220.

[b] Zeitsch. Wiss. Zool., LXIV, 1898, p. 348.

[c] R. de la Sagra's Histoire, etc.

Epicrates inornatus.

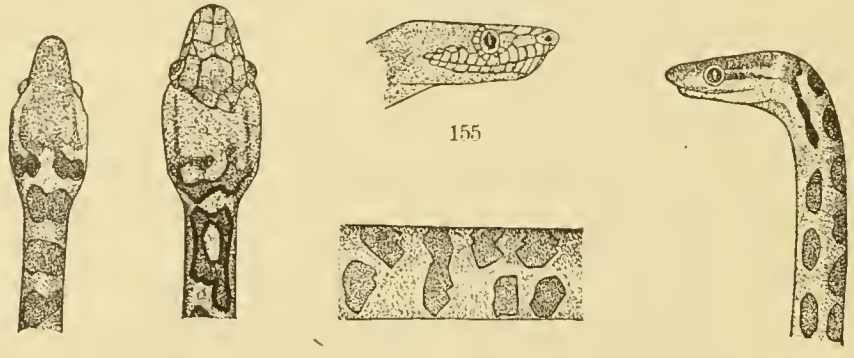
Museum.	No.	Age.	Locality.	Whencollected.	By whom collected or recorded.	Scale rows.	Ventrals.	Caudals.	Remarks.
U.S.N.M.	12446	Young	Porto Rico..	.....	[Latimer]	.....	269	.....	Figs. 151–152.
Do...	27456	Adult.	.....do	.....	Capt. Hansard.....	42	266	71	
Do...	27734	...do ..	Caguas	.....	C. G. Stevenson....	39	265	57(def.)	Description, p. 690, figs. 148–150.
Do...	27769	...do ..	Humacao...	Spring, 1900.	L. M. McCormick..	38	269	53(def.)	
Do...	29583	...do ..	Caguas	.....	B. S. Bowdish.....	41	262	70	
Copenhagen.	.....	...do ..	Porto Rico..	.....	Reinhardt, p. 253...	.....	271	69	Types.
Do...	.....	...do ..	.....do	.....	.....do	.....	268	.....	
Do...	.....	...do ..	.....do	.....	.....do	.....	264	67	
	.....	...do ..	Philippine Islands.	.....	Scoane, p. 2	43	265	75	
M.C.Z.C.	.....	...do ..	Bayamon...	.....	Garman, p. 132.....	36–40	266–271	.....	
Milano ..	.....	Young	Antilles	.....	Jan.[a].....	.....	261	74	

[a] Icon. Ophid., texte, 2 livr., 1865, p. 87.

EPICRATES MONENSIS[a] Zenneck.

1898. *Epicrates monensis* Zenneck, Zeitschr. Wiss. Zool., LXIV, p. 64, pl. III, figs. 58–62; type locality, Mona I.; types, Hamburg Mus. No. 2034.

1901. *Epicrates fordii* var. *monensis* Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, p. 8 (Mona Island).



153 154 155 156 157

Figs. 153–157.—Epicrates monensis, young. 153, color pattern, top of head; 154, color pattern, top of head of another specimen; 155, side of head, scutellation; 156, color pattern of body, lateral view; 157, color pattern, side of head and neck. Copies from Zenneck, figs. 53–62. Specimens in Hamburg Museum.

Description.—Young: Hamburg Naturhist. Museum, No. 2034c (cotype); Mona Island; 1894; Bock, collector. Rostral higher than broad, tip just visible from above; internasals as broad as long; anterior pair of prefrontals larger, posterior shorter, broadly in contact and without intervening scales; frontal as broad as long, twice as broad as supraoculars; parietals small, smaller than posterior prefrontals, separated by a scale; first supralabial in contact with nasal, second with

[a] From Mona Island.

nasal and loreal; loreal large, longer than high and in contact with nasal, both prefrontals, preocular and second, third, fourth, and fifth supralabials; a large preocular with a subpreocular consisting of the detached upper half of sixth supralabial; seventh supralabial reaches eye; eighth supralabial separated from eye by a small subocular; no labial pits; five postoculars; temporal scales small, somewhat larger and more angular than the body scales; 42 scales around the body; 259 ventrals; anal entire; 79 subcaudals.

The pattern of the upper side of the body consists of two upper (dorso-lateral) rows of spots, which almost everywhere are connected with each other across the back; the dorso-lateral spots, which extend to the end of the tail, are of more irregular form than in *E. fordii*, their number varying between 51 and 57; on the sides of the body, but not beyond the vent, there is a single row of rather large spots, which frequently connect with those of the upper side so as to form transverse bands; a rather indistinct postocular stripe seems to be a continuation of the lateral scale row; on the head there are but traces of markings except on the posterior part; the ground color of the upper surfaces is a very light yellowish-brown in the young specimens, the markings very dark brownish-black; in the older ones the ground color is much darker, so as to make the markings less prominent. (From Zenneck's original color description.)

Dimensions (of No. 2034c).

	mm.
Total length	350
Snout to vent	280
Vent to tip of tail	70

The largest adult specimen (No. 2034b), with a defective tail, measures from snout to vent 1.010 m.

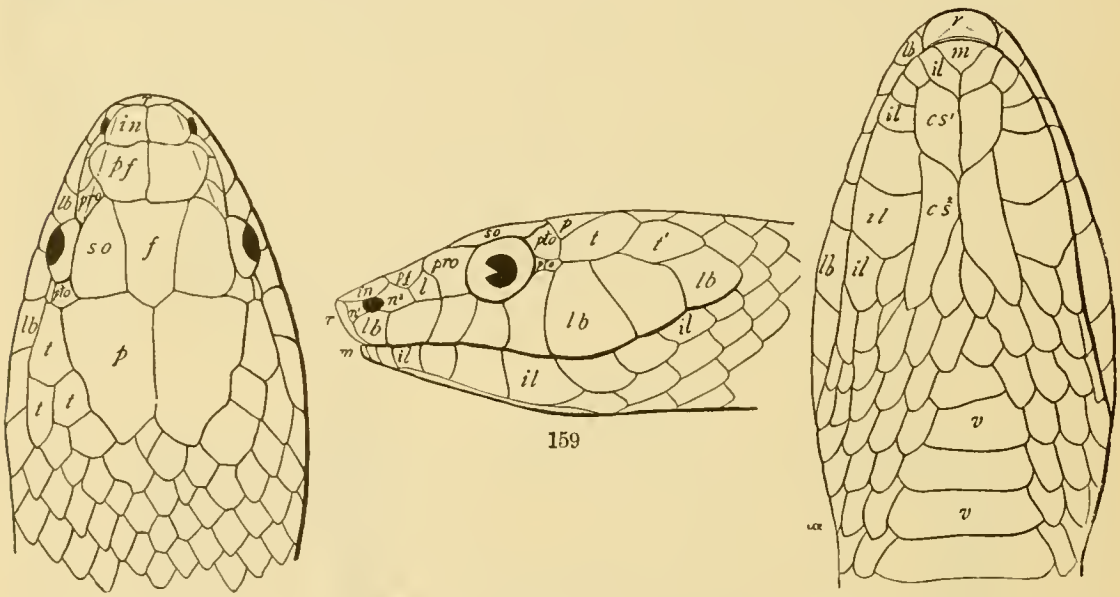
Variation.—According to Meerwarth the scale rows (in five specimens) vary from 38 to 43, the ventrals from 259 to 266, and the caudals (in two specimens) from 79 to 82. Four specimens have 13 supralabials on both sides, one (No. 2034a) has 11 on one side, 13 on the other.

Habitat.—This form seems to be confined to Mona Island. Notwithstanding the fact that Bock collected five specimens for the museum in Hamburg it can not be common there, for Mr. Bowdish, during his visit to the island in 1901 failed to see a single one. In his letter he assures me that it was entirely unknown to the few inhabitants now living there.

Remarks.—Never having seen a specimen of *E. fordii* I shall pass no opinion on the distinctness of *E. monensis*. The latter certainly seems to have more scale rows (38 to 43 as against 33 to 37) and if *E. fordii* always has one or more scales interpolated between the posterior prefrontals as indicated by Zenneck's figures, they may be more distinct than Meerwarth seems to admit, as he makes *E. monensis* a variety of *E. fordii*.

On the other hand, I would call attention to the fact that in many points *E. monensis* agrees more closely with Cope's *E. chrysogaster*, from Turks Island, Bahamas, which certainly merits separation[a] if *E. monensis* is entitled to specific or subspecific rank. Thus *E. chrysogaster* has 43 scale rows. It has 54 dorsal spots (*E. monensis* 51–57; *E. fordii* 69–78). The number of the spots is the cardinal point which led Zenneck to regard *E. monensis* as a species distinct from *E. fordii*. It will be seen that *E. chrysogaster* in this respect is identical, so much so that *E. monensis* and *E. chrysogaster*, to use Dr. Zenneck's phraseology, are only different "Zeichnungsformen" of the same thing. He suggests differences, however, in the cephalic scutellation, and until that question can be settled it is the better plan to keep the different forms apart under separate names.

There are no specimens of this form in the U. S. National Museum, and I only know it from a cursory examination of the five specimens in the Hamburg Museum in August, 1901, when the above description was made.



FIGS. 158–160.—HEAD-SHIELDS OF A CORONELLIDE SNAKE. *cs*[1], anterior chin-shields; *cs*[2], posterior chin-shields; *f*, frontal; *il*, lower labials; *in*, internasals; *l*, loreal; *lb*, supralabials; *m*, mental; *n*[1], anterior nasal; *n*[2], posterior nasal; *p*, parietal; *pf*, prefrontals; *pro*, preocular; *pto*, postocular; *r*, rostral; *so*, supraocular; *t*, temporals; *v*, ventrals.

Genus LEIMADOPHIS[b] Fitzinger.

1842. *Dromicus* BIBRON in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, Rept., p. 133 (type, *Coluber cursor*) (not *Dromica* Dejean, 1826).

1843. *Leimadophis* FITZINGER, Syst. Rept., p. 26 (type, *Coronella almadensis=L. reginæ*).

1843. *Calophis* FITZINGER, Syst. Rept., p. 26 (type, *Herpetodryas cursor*).

1894. *Liophis* BOULENGER, Cat. Sn. Brit. Mus., II, p. 126 (type, *L. pœcilogyrus*) (not of Wagler, 1830).

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[a] It has been united with *E. fordii* by Boulenger (Cat. Sn. Brit. Mus., I, 1893, p. 98).

[b] λειμαξ, άδος=meadow; ὄφις=snake.

Only two coronelline genera occur in Porto Rico, both of which are very much alike. They may be easily distinguished by the presence or absence of paired pores, or round translucent spots, near the apex of the dorsal scales. In the present genus there is occasionally found a single, more or less obscure, pore, but in the genus *Alsophis* the pair is very much in evidence, and can usually be seen with the naked eye.

Two species occur within our territorial limits, the chief distinction of which is the number of subcaudal shields. They may be identified as follows:

a¹ Ventrals more than 150 (151–159) ..... *L. stahli*, p. 695.
a² Ventrals less than 150 (134–146) ..... *L. exiguus*, p. 698.

LEIMADOPHIS STAHLI,[a] new species.

1876. *Dromicus parvifrons* Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 708 (Porto Rico) (not of Cope).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 312 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, pp. 70, 160 (Porto Rico).

Diagnosis.—Tail less than four times in total length; supralabials eight, three entering orbit; scale rows, 19; ventrals, 151 to 159; subcaudals, 83 to 97 pairs.

Type.—U.S.N.M. No. 27323; Bayamon; Dr. A. Stahl, collector.

Habitat.—Porto Rico.

Description of type specimen.—Adult; U.S.N.M. No. 27323; Bayamon, Porto Rico; 1900; Dr. A. Stahl, collector. Rostral much broader than high, scarcely visible from above; internasal suture shorter than prefrontal suture; frontal longer than its distance from end of snout, shorter than parietals, widely separated from preocular; supraocular narrower than frontal; nasal divided, longer than its distance from eye; loreal small, as high as broad, pentagonal; one large preocular; two postoculars; one large anterior temporal followed by two smaller ones; eight supralabials, second in contact with posterior nasal, loreal, and preocular; third, fourth, and fifth supralabials in contact with eye; eight lower labials, four in contact with anterior chin-shield, two in contact with posterior; anterior chin-shields much shorter than posterior ones; scales smooth, without pores, in 19 rows; ventrals, 157; anal divided; 89 pairs of subcaudals.

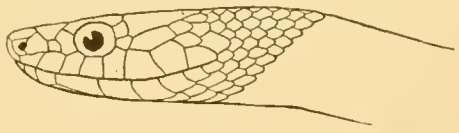
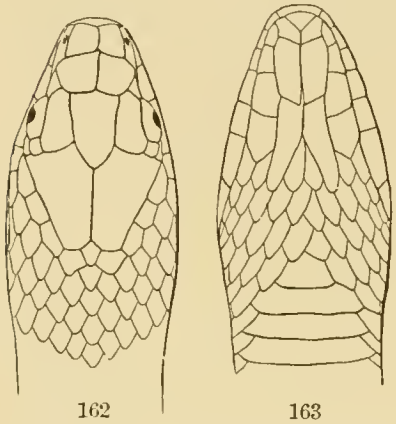


Fig. 161.—Leimadophis stahli, type. 2 × natural size. Side of head. No. 27323, U.S.N.M.

Color pattern: On a brownish ground a narrow dusky lateral line covering the adjacent edges of the fourth and fifth scale-rows; above this line a pale longitudinal band covering the remaining part of fifth, the whole of sixth, and other half of seventh rows; a median dorsal

[a] Dedicated to Dr. A. Stahl, of Bayamon, the venerable Porto Rican patriot and naturalist, from whom I received the type specimen.

darker band of six scale-rows is thus set off, a series of elongated dusky spots on the seventh row, three scales apart, forming the limit as a line of dashes; head above with numerous dusky spots, and a longitudinal line on the middle of the frontal and the parietal suture which, in combination with a spot on the posterior half of each supraocular, form a fleur-de-lis-shaped figure, the median line continuing some distance down the back; a dusky, black-edged band on the side of the head from rostral through nostril and eye over temporals and connected with the continuous dark lateral line on fourth and fifth scale-rows; labials whitish with a dusky spot on the middle of each, and a dusky oblique band from the eye to the commissure crossing the suture between fourth and fifth supralabials; underside whitish, dusted over with minute dusky specks, which show a tendency to congregate near the ends of the ventrals so as to form a line of ill-defined spots on each side of the abdomen.



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FIGS. 162-163.—LEIMADOPHIS STAHLI. 2 × natural size. 162, top of head; 163, underside of head. No. 26883, U.S.N.M.

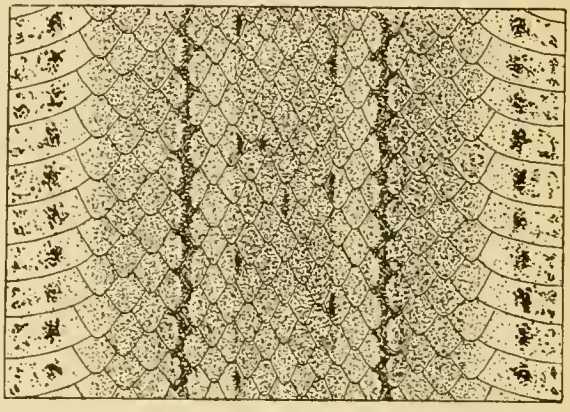


FIG. 164.—LEIMADOPHIS STAHLI. 2 × natural size. Color pattern around middle of body. No. 26883, U.S.N.M.

Dimensions.

	mm.
Tip of snout to tip of tail	392
Vent to tip of tail	125

Variation.—Only one of the specimens examined shows any marked variation, namely, No. 26883, in which the posterior nasal is fused with the loreal. The number of ventrals (in 10 specimens) vary between 151 and 159, the subcaudals between 83 and 97 pairs. The coloration is also fairly constant. In No. 25529, the largest specimen at hand (550 mm.), the spots on the median dorsal row are forming an almost continuous line; the underside is also less dusted over, the blackish specks being more concentrated in the lateral abdominal line, which is rather broad and continuous, and toward the middle line, where they form two lines of ill-defined spots. In No. 26883 (fig. 164) the median dorsal line of spots is but slightly indicated.

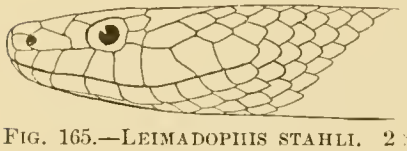


FIG. 165.—LEIMADOPHIS STAHLI. 2 × natural size. No. 26883, U.S.N.M.

Color of living specimen.—U.S.N.M. No. 26883; Catalina Plantation; March 2, 1900; L. Stejneger, No. 9042. General color purplish reddish-brown; underside whitish, with a pinkish tinge on the median line; markings (fig. 164) dusky; iris reddish silvery.

Habitat.—This species appears to be strictly confined to Porto Rico, and probably does not go much higher than 1,000 feet altitude. Some doubt attaches to the locality given for specimen No. 25529 (Adjuntas) and it was probably collected at a lower level.

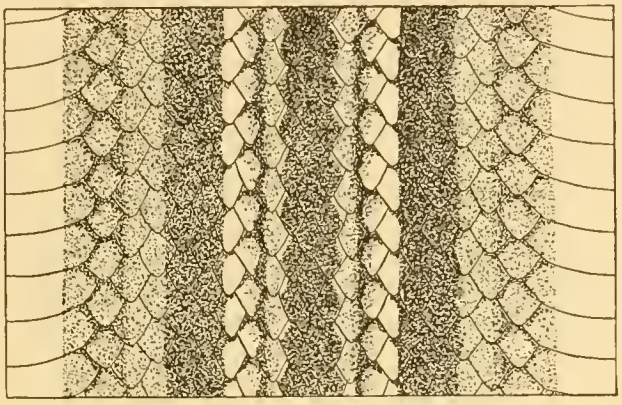


FIG. 166.—LEIMADOPHIS PARVIFRONS. Haiti. 2 × natural size. Color pattern around the middle of the body. No. 9831, U.S.N.M.

Remarks.—This snake was first recorded from Porto Rico by Professor Peters on the strength of several specimens received at the Berlin Museum from Dr. Gundlach, but he erroneously identified them with *Dromicus parvifrons* from Haiti, of which he had no specimens for comparison. The latter species is very different, however, not only in having many more subcaudals (in 33 specimens 110 to 130), but also in a different color pattern, as shown in fig. 166.

As a matter of fact, the Porto Rican species, here described as new, is much more closely allied to Cope's *Dromicus exiguus* from the Virgin Islands, the chief difference consisting in the lower number of ventrals in the latter species, as will be shown under that heading.

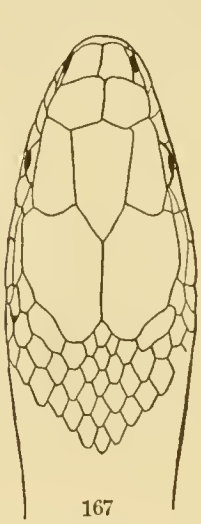
Leimadophis stahli.

Museum.	No.	Age.	Locality.	When collected.	By whom collected or recorded.	Scale rows.	Ventrals.	Anals.	Caudals, pairs.	Remarks.
U.S.N.M..	7109	Male..	Porto Rico..	.....	[Latimer].....	19	153	2	92	
Do.....	25529	...do ..	Adjuntas? ..	.....	A. B. Baker.....	19	155	2	97	
Do.....	25616	Female	Caguas	Jan. 12, 1899	.....do.....	19	158	2	83	
Do.....	25724	Male..	El Yunque, East slope.	Feb. 19, 1899	U.S.F.C. party.	19	157	2	92	Between 600 and 900 feet altitude.
Do.....	26883	Female	Catalina Plantation.	Mar. 2, 1900	L. Stejneger....	19	158	2	85	Figs. 162–164.
Do.....	27323	...do..	Bayamon...	——.—, 1900	Dr. A. Stahl	19	157	2	87	Type, fig. 161.
Do.....	27768	...do ..	Humacao...	——.—, 1900	L. M. McCormick	19	158	2	88	
Berlin	.....	.....	Porto Rico..	.....	Dr. Tornier in letter.	....	157	...	93	Peters's *D. parvifrons.*
Do.....	.....	.....	.....do	.....	.....do.....	....	159	...	88	
Do.....	.....	.....	.....do	.....	.....do.....	....	151	...	94	

LEIMADOPHIS EXIGUUS[a] (Cope).

1862. *Dromicus exiguus* Cope, Proc. Phila. Acad., 1862, p. 79 (type localities, St. John and St. Thomas, West Indies; type in U. S. Nat. Mus.; Riise, collector).—Reinhardt and Luetken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862 (1863), p. 216; author's separate p. 64 (St. John, St. Thomas, Mus. Copenh.; Riise, collector).—Garman, Proc. Amer. Philos. Soc., XXIV, 1887, p. 282 (St. Thomas; Mus. Comp. Zool. Cambr.).—Boulenger, Cat. Sn. Brit. Mus., II, 1894, p. 126 (St. Thomas; Brit. Mus.; Challenger exped.).—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 14 (St. Thomas, Hamb. Mus.; Callwood, collector).

Description.—Adult; U.S.N.M. No. 26101; Culebra Island; February 9, 1899; A. B. Baker, collector. Rostral scarcely visible from above; internasal suture shorter than prefrontal suture; frontal long, longer than the parietal suture, but shorter than the parietals; loreal



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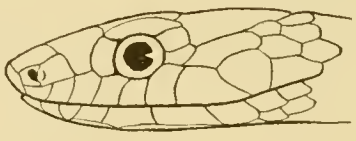

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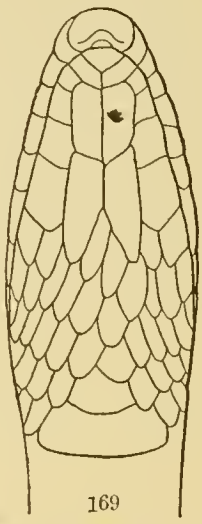

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Figs. 167–169.—Leimadophis exiguus. 3½ × natural size. 167, top of head; 168, side of head; 169, underside of head. No. 26101, U.S.N.M.

(abnormally) joined to prefrontals; one preocular; two postoculars; one long anterior temporal, and two smaller posterior ones; eight supralabials, third, fourth, and fifth entering eye (on left side nine, fourth, fifth, and sixth entering eye); posterior chin-shields longer than anterior ones; 19 rows of smooth scales without pores; 144 ventrals; anal divided; subcaudals, 82 pairs. Color as described under *Leimadophis stahli*, p. 695, but paler.

Dimensions.

	mm.
Tip of snout to tip of tail	310
Vent to tip of tail	100

Variation.—The above specimen is abnormal in having no loreal. Ordinarily the loreal is very small, sometimes even rudimentary, and Reinhardt and Luetken mention a specimen having none on the left

[a] Latin=small, short, trifling.

side, preocular and postnasal being in contact. Garman mentions a specimen in the museum at Cambridge, Massachusetts, having the prefrontals fused on the median line. The normal number of supralabials is 8, but the Culebra specimen described has 9 on one side. Meerwarth describes a similar specimen from St. Thomas. Ventrals (in 19 specimens recorded) vary between 134 and 146, subcaudals between 79 and 86 pairs.

Habitat.—Thus far this species has only been known from St. Thomas and St. John. During his visit to Culebra Island Mr. A. B. Baker secured a single specimen there. The probability is that it will also be found on Vieques. It does not occur in Porto Rico proper, where its place is taken by *Leimadophis stahli*, described above.

Remarks.—The only essential difference between *L. exiguus* and *L. stahli* seems to be the lower number of ventrals in the former. Altogether 29 specimens of both species have been examined and recorded, and in these the difference is marked and constant.

Leimadophis exiguus.

Museum.	No.	Age.	Locality.	When collected.	By whom collected or recorded.	Scale rows.	Ventrals.	Anal.	Caudals, pairs.	Remarks.
U. S. N. M.	26101	Female	Culebra Island.	Feb. 9, 1899	A. B. Baker....	19	144	2	82	Description, p. 698, figs. 177–169.
Copenhagen.	.....	.....	Virgin Islands.	.....	Reinh.-Luetk., p. 218.	19	141	...	....	
Do.....	.....	.....	.....do.....	.....	.....do.....	19	146	...	84	
Do.....	.....	.....	.....do.....	.....	.....do.....	19	145	...	85	
M. C. Z. C..	.....	.....	St. Thomas.	.....	Garman, p. 282.	19	139	2	80	
Do.....	.....	.....	.....do.....	.....	.....do.....	19	140	2	83	
Brit. Mus..	.....	Young	.....do.....	.....	Boulenger, p. 126.	19	138	2	83	
Hamburg..	2337*a*	.....	.....do.....	—— —, 1895	Meerwarth, p. 14.	19	143	...	86	
Do.....	2337*b*	.....	.....do.....	—— —, 1895	.....do.....	19	141	...	79	
Do.....	2380*a*	.....	.....do.....	—— —, 1894	.....do.....	19	139	...	81	
Do.....	2380*b*	.....	.....do.....	—— —, 1894	.....do.....	19	134	...	79	
Do.....	2899*a*	.....	.....do.....	—— —, 1898	.....do.....	19	143	...	83	
Do.....	2899*b*	.....	.....do.....	—— —, 1898	.....do.....	19	144	...	81	
Do.....	2899*c*	.....	.....do.....	—— —, 1898	.....do.....	19	141	...	82	
Do.....	2899*d*	.....	.....do.....	—— —, 1898	.....do.....	19	.....	...	86	

Genus ALSOPHIS[a] Fitzinger.

1843. *Alsophis* Fitzinger, Syst. Rept., p. 26 (type *Psammophis antillensis* Schlegel).
1862. *Haliophis* Cope, Proc. Phila. Acad., 1862, p. 77 (emend.).
1882. *Alophis* Stahl, Fauna Puerto-Rico, p. 70 (err.).
1884. *Ocyophis* Cope, Proc. Amer. Philos. Soc., XXIII (p. 491), (type *O. ater*).

[a] ἄλσος, woodland; ὄφις, serpent.

1887. *Halsophis* Cope, Proc. U. S. Nat. Mus., X, 1887, p. 439 (emend.).
1894. *Dromicus* Boulenger, Cat. Sn. Brit. Mus., II, p. 118 (type *D. angulifer*), (not of Bibron, 1842).

The species of this genus resemble those of *Leimadophis* closely, but may easily be distinguished by the pair of conspicuous pores or pits near the tip of the dorsal scales.

The type of Bibron's genus *Dromicus* is plainly stated to be *Coluber cursor* of Lacépède, and *D. angulifer*, therefore, can not be so regarded.

Two species of this West Indian genus occur within our territory, their distribution being exactly parallel to that of the two species of *Leimadophis*, inasmuch as one inhabits Porto Rico proper (and Mona Island), while the other is confined to the Virgin Islands, Culebra and Vieques. The chief difference in this case is not in the number of the ventrals, which is almost the same in the two species, but in the number of scale rows round the body.

They may be distinguished as follows:

a^1 Scale rows, 17; fifth scale row without any distinctive color feature.
A. portoricensis, p. 700.

a^2 Scale rows, 19; every second or third scale of the fifth scale row particolored, the upper half being whitish, the lower half blackish (fig. 174).
A. antillensis, p. 704.

ALSOPHIS PORTORICENSIS [a] Reinhardt and Luetken.

1863. *Alsophis portoricensis* Reinhardt and Luetken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862, p. 221; authors' separate p. 69 (type locality, Porto Rico).—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 708 (Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 313 (Porto Rico).—*Alophis p.* Stahl, Fauna Puerto-Rico, 1882, pp. 70, 160.
1887. *Alsophis melanichnus* Garman, Proc. Amer. Philos. Soc., XXIV, 1887, p. 283 (Bayamon, Porto Rico) (not of Cope?).
1896. *Dromicus sanctæ-crucis* var. *portoricensis* Boulenger, Jahresber. Naturw. Ver. Magdeburg, 1894–1896, p. 113 (Mona).—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 11 (Mona).
1896. *Dromicus sanctæ-crucis* Boulenger, Cat. Sn. Brit. Mus., III, p. 634 (Mona I.) (not of Guenther).

From the above synonymy it might be inferred that the present species is most intimately related to *Alsophis sancticrucis* of Cope, as it has been made a subspecies of the latter by authors who regard *A. antillensis* as specifically distinct. Such is not the case, however. This treatment of the three forms is only due to the fact that both *A. portoricensis* and *A. sancticrucis* have 17 scale rows while *A. antillensis* has 19. But apart from the difference in the number of ventrals between the former, a character at least as important as that of the scale rows, the *A. portoricencis* and *A. antillensis* are really more nearly related than either of them is to *A. sancticrucis*.

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[a] From Porto Rico.

The question whether Cope's *A. melanichnus*, from Haiti, is identical with the Porto Rican species can not be said to be settled yet. The scale formula seem to be the same, but it is not certain that there may not be other distinguishing features. It will be noted that the *Alsophis* from Mona is referred to the Porto Rican form without hesitation by those having had an opportunity to examine it, but it should be remembered that none of these authors had any Porto Rican specimens for comparison and that the identification is based entirely on the scale formula. Under these circumstances the whole question can not be solved until some one is able to compare directly large series from each of these islands. We have such startling proof of the effect of isolation working with a variable material to produce separate forms of these snakes that it is quite unwarrantable to lump the various names without incontrovertible proof.

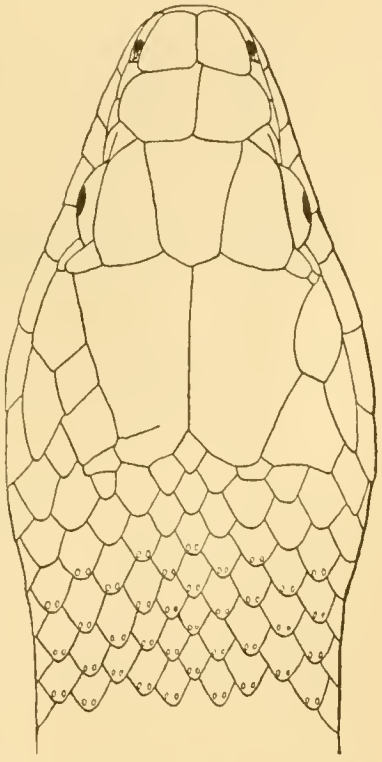


FIG. 170.—ALSOPHIS PORTORICENSIS. 2 × natural size. No. 27766, U.S.N.M.

Professor Garman[a] mentions as a good distinguishing character of the Porto Rican specimens "the narrowness of the lower postorbital." This character is not confined to this form alone, as it is also found in *Alsophis antillensis*.

Description.—Adult; U.S.N.M. No. 27766; Humacao, Porto Rico; spring 1900; L. M. McCormick, collector.—Rostral much broader than high, barely visible from above; internasal suture shorter than prefrontal suture; frontal broader than supraoculars, as long as its distance from the tip of snout, which is shorter than parietal suture; nostril large, between two large nasals; loreal moderate, trapezoid; one preocular, not in contact with frontal; two postoculars, the lower one very narrow; temporals 1+2; 8 supralabials, third, fourth, and fifth in contact with eye; fifth and following ones suddenly much higher than the others; five lower labials in contact with anterior chin-shield which is shorter than the posterior; 17 rows of smooth scales round the body, with two conspicuous pores near the tip; 173 ventrals; anal divided; 128 pairs of subcaudals. Color (in alcohol) above uniform brownish drab, below whitish; each scale anteriorly tipped with black, posteriorly narrowly margined with black so as to form a regular network; ventrals, except on throat and neck, as well as the subcaudals, narrowly edged with black; a narrow blackish line emphasizes the suture bordering the supralabials above.

[a] Proc. Amer. Philos. Soc., XXIV, 1887, p. 283.

Dimensions.

	mm.
Tip of snout to tip of tail	1,035
Vent to tip of tail	360

Variation.—The scutellation of this species shows very little variation. Of 44 specimens referred to it all have 17 scale rows; nor is it known that the number of labials, temporals, or oculars show any abnormalities in this large series. The ventrals vary between 169 and 183 (average 178) and the subcaudals between 112 and 129 pairs.

The coloration is apparently more variable. A somewhat larger specimen from the same locality as the one described above is colored essentially alike, and with these agree the type specimens from Porto Rico as described by Reinhardt and Luetken. Our single specimen from Desecheo Island (No. 29356), which is somewhat smaller, does not show the characteristic reticulation, there being only some scattered black edges to the lateral scales; the underside is whitish, with no black posterior edge to the ventrals or caudals, but the throat is densely speckled with blackish and there is an interrupted dusky line on each side of the abdomen on the lateral angle; the upper labials are white with numerous blackish spots near the commissure; a heavy black line across the rostral extends on each side of the face on the upper labial suture through the eye, continuing backward on the side of the neck where it gradually disappears as a series of ill-defined spots; there are also traces of a blackish line on the parietal suture with a posterior continuation as a median vertebral line. Mr. Meerwarth indicates a similar, though greatly variable, coloration for the large series of snakes from Mona Island.

Professor Garman mentions that on young Porto Rican specimens "the dark-bordered scales are distributed in such way as to form irregular transverse bands, more indistinct in larger ones."

Habitat.—This species was originally described from Porto Rico proper, where it now seems to be comparatively rare, since none of the *Fish Hawk* parties, including Mr. A. B. Baker, nor Dr. Richmond and myself encountered specimens. The mongoose is probably responsible for this state of affairs.

The status of the snake living on Mona Island, especially with reference to the form occurring in Haiti, remains yet to be investigated. For the present it is left with the Porto Rican species. It must have been very numerous on that little islet, since no less than 38 specimens have found their way to the museums of Magdeburg and Hamburg. It is then quite remarkable that Mr. Bowdish, who visited the island in 1901, failed to hear of it there.

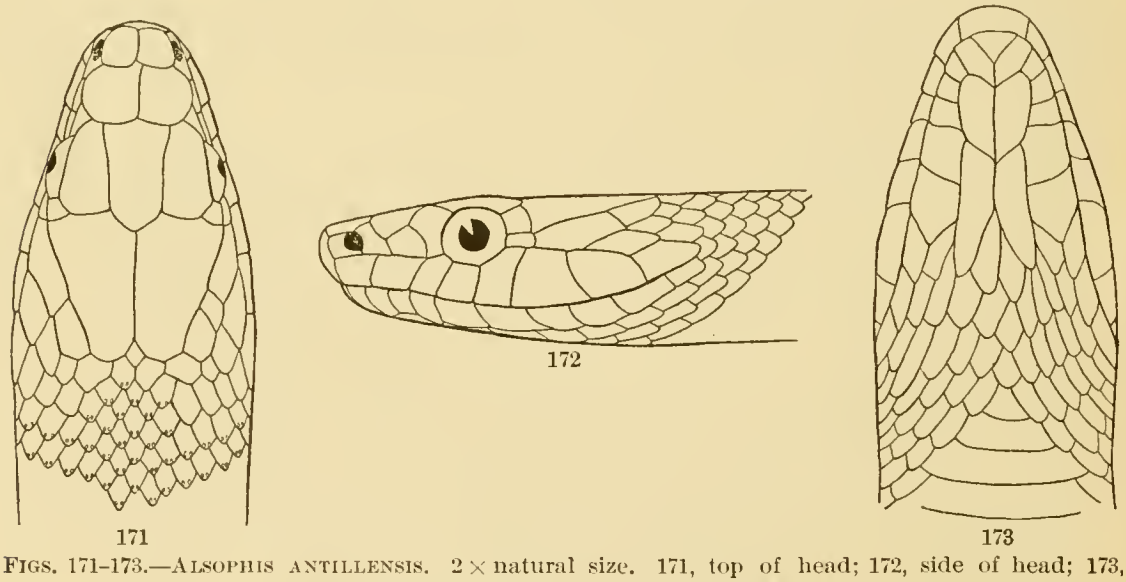
Alsophis portoricensis.

Museum.	No.	Age and sex.	Locality.	When collected.	By whom collected or recorded.	Scale rows.	Ventrals.	Anal.	Caudals, pairs.	Remarks.
U. S. N. M..	27766	Adult male...	Humacao.	——, 1900	L. M. McCormick.	17	173	2	128	Deser., p. 701, fig. 170.
Do.....	27767	Adult female.	.....do	——, 1900	.....do	17	181	2	.....	
Do.....	29356	Halfgrown ...	Desecheo Island.	——, 1901	B. S. Bowdish.	17	183	2	.....	Deser., p. 702.
Magdeburg		Adult male...	Mona Island.	....	Boulenger, p. 114.	....	171	...	.....	
Do.....	.....	.....do	.....do	.....	.....do	....	173	...	121	
Do.....	.....	.....do	.....do	.....	.....do	....	170	...	121	
Do.....	.....	Adult female.	.....do	.....	.....do	....	179	...	114	
Do.....	.....	.....do	.....do	.....	.....do	....	176	...	116	
Do.....	.....	.....do	.....do	.....	.....do	....	176	...	112	
Do.....	.....	Young.....	.....do	.....	.....do	....	177	...	120	
Do.....	.....	.....do	.....do	.....	.....do	....	175	...	117	
Do.....	.....	.....do	.....do	.....	.....do	....	172	...	125	
Do.....	.....	.....do	.....do	.....	.....do	....	174	...	122	
Do.....	.....	.....do	.....do	.....	.....do	....	181	...	126	
British Museum.	.....	Adult male...	.....do	.....	Boulenger, p. 634.	....	173	...	.....	
Do.....	.....	.....do	.....do	.....	.....do.....	....	176	...	121	
Do.....	.....	Adult female.	.....do	.....	.....do.....	....	177	...	113	
Do.....	.....	Young.....	.....do	.....	.....do.....	....	170	...	123	
Hamburg..	1583	.....	.... do	——, 1891	Meerwarth, p. 11.	17	173	...	119	
Do.....	1720	.....	.....do	——, 1892	.....do.....	17	179	...	118	
Do.....	2029*a*	.....	.....do	——, 1894	.....do.....	17	172	...	.....	
Do.....	2029*b*	.....	.....do	——, 1894	.....do.....	17	175	...	.....	
Do.....	2029*c*	.....	.....do	——, 1894	.....do.....	17	177	...	.....	
Do.....	2029*d*	.....	.....do	——, 1894	.....do.....	17	177	...	124	
Do.....	2029*e*	.....	.....do	——, 1894	.....do.....	17	174	...	124	
Do.....	2029*f*	.....	.....do	——, 1894	.....do.....	17	179	...	.....	
Do.....	2029*g*	.....	.....do	——, 1894	.....do.....	17	181	...	122	
Do.....	2029*h*	.....	.....do	——, 1894	.....do.....	17	178	...	119	
Do.....	2029*i*	.....	.....do	——, 1894	.....do.....	17	173	...	.....	
Do.....	2029*k*	.....	.....do	——, 1894	.....do.....	17	179	...	118	
Do.....	2029*l*	.....	.....do	——, 1894	.....do.....	17	175	...	118	
Do.....	2029*m*	.....	.....do	——, 1894	.....do.....	17	180	...	.....	
Do.....	2029*n*	.....	.....do	——, 1894	.....do.....	17	177	...	.....	
Do.....	2029*o*	.....	.....do	——, 1894	.....do.....	17	177	...	122	
Do.....	2029*p*	.....	.....do	——, 1894	.....do.....	17	177	...	123	
Do.....	2029*q*	.....	.....do	——, 1894	.....do.....	17	174	...	.....	
Do.....	2029*r*	.....	.....do	——, 1894	.....do.....	17	179	...	118	
Do.....	2029*s*	.....	.....do	——, 1894	.....do.....	17	174	...	123	
Do.....	2029*t*	.....	.....do	——, 1894	.....do.....	17	175	...	125	
Do.....	2029*u*	.....	.....do	——, 1894	.....do.....	17	176	...	117	
Do.....	2029*v*	.....	.....do	——, 1894	.....do.....	17	178	...	120	
Copenhagen.	.....	Adult.....	Porto Rico	.....	Reinhardt and Luetken, p. 223.	17	175	...	122	
M.C.Z.C ...	.....	.....	Bayamon, Porto Rico.	.....	Garman, p. 283.	17	169	...	125	
Do.....	.....	.....	.....do	.....	.....do.....	17	170	...	129	

ALSOPHIS ANTILLENSIS[a] (Schlegel).

1837. *Psammophis antillensis* Schlegel, Phys. Serp., II, p. 214 (type localities: St. Thomas, Guadeloupe, Martinique, Cuba) (part: St. Thomas).—*Dromicus a.* Duméril and Bibron, Erpét. Gén., VII, i, 1854, p. 659 (part: St. Thomas).—Guenther, Cat. Colubr. Sn. Brit. Mus., 1858, p. 129 (St. Thomas).—Cope, Proc. Phila. Acad., 1860, p. 560 (St. Thomas).—Jan, Icon. Ophid., livr. 25, 1867, pl. 1, fig. 1 (St. Thomas).—Boulenger, Cat. Sn. Brit. Mus., II, 1894, p. 123 (Vieques, St. Thomas).—Meerwarth, Mitth. Naturh. Mus. Hamburg, XVIII, 1901, p. 12, pl. 1, fig. 13 (St. Thomas).—*Alsophis a.* Cope, Proc. Phila. Acad., 1862, p. 76.—Reinhardt and Luetken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862 (1863), p. 218; author's separate, p. 66 (St. Thomas, St. John, Vieques).—Garman, Proc. Amer. Philos. Soc., XXIV, 1887, p. 282 (St. Thomas; Haiti [?]).

This species, as said before, differs essentially from *A. portoricensis* in having 19 scale rows around the body instead of 17. But while this is true in the vast majority of cases, there may occasionally be found a specimen with two scale rows too few or too many. Thus, out of 78



171 172 173

Figs. 171–173.—Alsophis antillensis. 2 × natural size. 171, top of head; 172, side of head; 173, underside of head. No. 25557, U.S.N.M.

specimens examined by me, or of which I have records, a single *A. antillensis*, from Culebra Island, has 17 scale rows. It would be difficult to identify this specimen by its scutellation alone, as its scale formula is identical with *A. portoricensis*, but that it is not the latter species is shown (apart from its habitat) by the peculiar color pattern of its fifth scale rows, which shows beyond a shadow of a doubt that it is only an abnormal *A. antillensis*.

Description.—Adult; U.S.N.M. No. 25554; Culebra Island; February 10, 1899; A. B. Baker, collector. Rostral much broader than high, barely visible from above; internasal suture scarcely shorter than the prefrontal suture; frontal broader than supraocular, about

[a] Antillean, from the Antillean Islands.

equaling its distance from the tip of the snout and the parietal suture; nostril between two nasals; loreal moderate, trapezoid, the posterior border being strongly convex; one preocular separated from frontal; two postoculars, the lower one very narrow; temporals 1+2; 8 supralabials, third, fourth, and fifth entering eye, the fifth and following ones abruptly much higher than the anterior ones; 5 lower labials in contact with anterior chin-shield, which is much shorter than the posterior; 19 rows of smooth scales with two conspicuous apical pores; 183 ventrals; anal double; 118 pairs of subcaudals. Color (in alcohol) above brownish drab, the individual scales irregularly tipped and edged with dusky; underneath whitish with dark-drab mottlings on chin and throat and a series of similarly colored dots on the lateral canthus of each ventral shield, forming a dotted line on each side of the abdomen, each ventral, moreover, posteriorly more or less irregularly edged with brownish drab; a few brownish irregular spots on the labials and upper head shields, with a double series of elongate brownish spots on the upper neck; from anterior nasal through eye a dark-brownish streak continuing on the sides of neck and body as a broken line of elongate spots; these spots which on the sides of the body occupy the lower half of every second or third scale in the fifth scale row, the upper half being whitish or decidedly paler than the ground color.

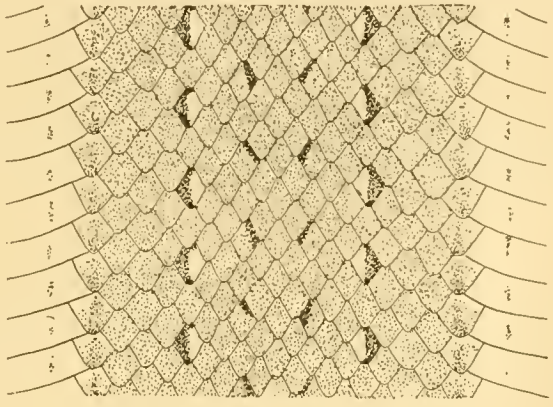


FIG. 174.—ALSOPHIS ANTILLENSIS. Color pattern around middle of body. No. 25557, U.S.N.M.

Dimensions.

	mm.
Tip of snout to tip of tail	1,130
Vent to tip of tail	340

Variation.—As in the foregoing species, the scale formula and other characters derived from the scutellation are unusually constant. Mention has already been made of No. 25556, from Culebra Island, the only one out of 34 specimens to have the exceptional number of 17 scale rows. At the same time it was remarked that this specimen is easily identified as *Alsophis antillensis* by the characteristic pattern of the fifth scale row—a feature first mentioned by Mr. Meerwarth. This marking appears to be constant, however variable the coloration may otherwise be. On the whole the coloration is much as in the specimen described above, but in the smaller specimens there is sometimes an indistinct dusky vertebral line from the parietal suture backward, while on the posterior part of the body and on the tail the scale rows next to the ventrals darkens so as to form a more or less distinct longitudinal band.

Habitat.—Like *Leimadophis exiguus*, the present species does not reach Porto Rico proper, but is confined to the islands of St. Thomas and St. John, Vieques, and Culebra. It is absent in St. Croix, where it is replaced by *Alsophis sanctieruels* (Cope), and in Porto Rico proper, where the corresponding species is *A. portoricensis*.

Prof. S. Garman records specimens of *A. antillensis* in the Museum of Comparative Anatomy, Cambridge, as coming from Haiti. This is the only report from this island, I believe, and I can not be but very skeptical as to the correctness of the locality, in regard to which I refer to similar remarks under *Anolis stratulus* and *A. pulchellus*, pages 654 and 664.

Mr. Riise, who collected for the museum in Copenhagen about forty years ago, obtained specimens of this species from Vieques. Neither Dr. Richmond, myself, Mr. A. B. Baker, nor any of the other members of the *Fishhawk* expedition met with it in that island, where it must now be rather scarce. On Culebra, however, the snakes are yet fairly common, and several specimens were collected there by Mr. Baker.

Alsophis antillensis.

Museum.	No.	Age and sex.	Locality.	When collected.	By whom collected or recorded.	Scale rows.	Ventrals.	Anal.	Subcaudals, pairs.	Remarks.
U. S. N. M.	25554	Adult female.	Culebra Island.	Feb. 10, 1899	A. B. Baker	19	183	2	118	Description, p. 704, figs. 171–173.
Do	25555	Half grown	do	do	do	19	184	2	.....	
Do	25556	do	do	do	do	17	175	2	125	
Do	25557	do	do	do	do	19	177	2	131	Fig. 174.
Do	26102	do	do		do	19	181	2	135	
Do	12403	do	St. Thomas		A. H. Riise.	19	184	2	117	
Do	12403a	do	do		do	19	183	2	128	
Copenhagen.			Virgin Islands.		Reinhardt and Luetken, p. 220	19	187	...	142	
Do			do		do	19	186	...	140	
Do			do		do	19	182	...	133	
Do			do		do	19	179	...	129	
British Museum.		Adult male	Vieques		Boulenger, p. 123.	19	179	2	116	
Do		Adult female.	do		do	19	189	2	.....	
Do		do	do		do	19	179	2	129	
Do		Adult male	St. Thomas		do	19	177	2	126	
Do		do	do		do	19	177	2	129	
Do		do	do		do	19	178	2	122	
Do		do	do		do	19	178	2	131	
Do		do	do		do	19	174	2	131	
Do		Adult female.	do		do	19	180	2	.....	
Do		Half grown	do		do	19	181	2	134	
Do		do	do		do	19	182	2	133	
Do		do	do		do	19	184	2	135	
Do		Young	do		do	19	174	2	126	

Alsophis antillensis—Continued.

Museum.	No.	Age and sex.	Locality.	When collected.	By whom collected or recorded.	Scale rows.	Ventrals.	Anal.	Subcaudals, pairs.	Remarks.
Hamburg..	2114*a*	.....	St. Thomas	——, 1896	Meerwarth, p. 12.	19	185	...	135	
Do.....	2114*b*	.....	....do....	——, 1896	.....do.....	19	171	...	133	
Do.....	2416*a*	.....	....do....	——, 1896	Meerwarth, p. 13.	19	175	...	133	
Do.....	2416*b*	.....	....do....	——, 1896	.....do.....	19	177	...	131	
Do.....	2339*a*	.....	....do....	——, 1895	.....do.....	19	186	...	144	
Do.....	2339*b*	.....	....do....	——, 1895	.....do.....	19	183	...	141	
Do.....	2539*a*	.....	....do....	——, 1896	Meerwarth, p. 12.	19	181	...	.....	
Do.....	2539*b*	.....	....do....	——, 1896	Meerwarth, p. 13.	19	185	...	129	
Do.....	2620	.....	....do....	——, 1897	Meerwarth, p. 12.	19	170	...	131	
Do.....	2898	.....	....do....	——, 1898	.....do.....	19	184	...	.....	

Order CHELONIA.

The turtles of Porto Rico, with the exception of the pond turtle (*Pseudemys palustris*), are strictly marine forms, whose limbs are specialized to the extent of having become paddles, the individual digits being externally obliterated, or nearly so.

Altogether only five species have been recorded from the island and its coasts, namely, four marine turtles and one fresh-water species, each belonging to a separate genus. They may be easily told apart by the following

KEY TO THE TURTLES REPORTED FROM PORTO RICO.

a^1 Shell without large horny shields; no claws; back with 5 longitudinal ridges (fig. 175) ..... *Dermochelys coriacea*, p. 708.

a^2 Shell covered with large horny shields; digits with at least one claw; back with at most 3 longitudinal keels (fig. 187).

b^1 Limbs with well-developed digits, five on each foot (fig. 184) *Pseudemys palustris*, p. 710.

b^2 Limbs paddle-shaped without separate digits (fig. 197).

c^1 At least five pairs of costal shields (fig. 187) ..... *Caretta caretta*, p. 715.

c^2 Four pairs of costal shields (fig. 193).

d^1 One pair of prefrontal shields (fig. 191) ..... *Chelonia mydas*, p. 716.

d^2 Two pairs of prefrontals (fig. 195) ..... *Eretmochelys imbricata*, p. 719.

Genus DERMOCHELYS[a] Blainville.

1816. *Dermochelys* Blainville, Bull. Soc. Philom. Paris, 1816, p. 111 (type *Testudo coriacea*).

1820. *Sphargis* Merrem, Syst. Amph., p. 19 (same type).

[a] δέρμα, skin; χέλυς, turtle.

DERMOCHELYS CORIACEA[a] (Linnæus).

1766. *Testudo coriacea* Linnæus, Syst. Nat., 12th ed., I, p. 350 (Mediterranean).—*Sphargis c.* Gray, Synops. Rept., I, 1831, p. 51 (Mediterranean; coast of England).—Duméril and Bibron, Erpét. Gén., II, 1835, p. 560 (Mediterranean and Atlantic).—Gosse, Nat. Soj. Jamaica, 1851, p. 306 (Jamaica).—Agassiz, Contr. Nat. Hist. U. S. Amer., I, 1857, p. 373 (Bahamas, West Indies).—Reinhardt and Luetken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862 (1863), p. 284; author's separate p. 132 (Virgin Islands).—Gundlach, in Poey's Repert. Fisico-Nat. Cuba, II, No. 5, Apr., 1867, p. 106 (Playa del Quemada, Cuba); Anal.

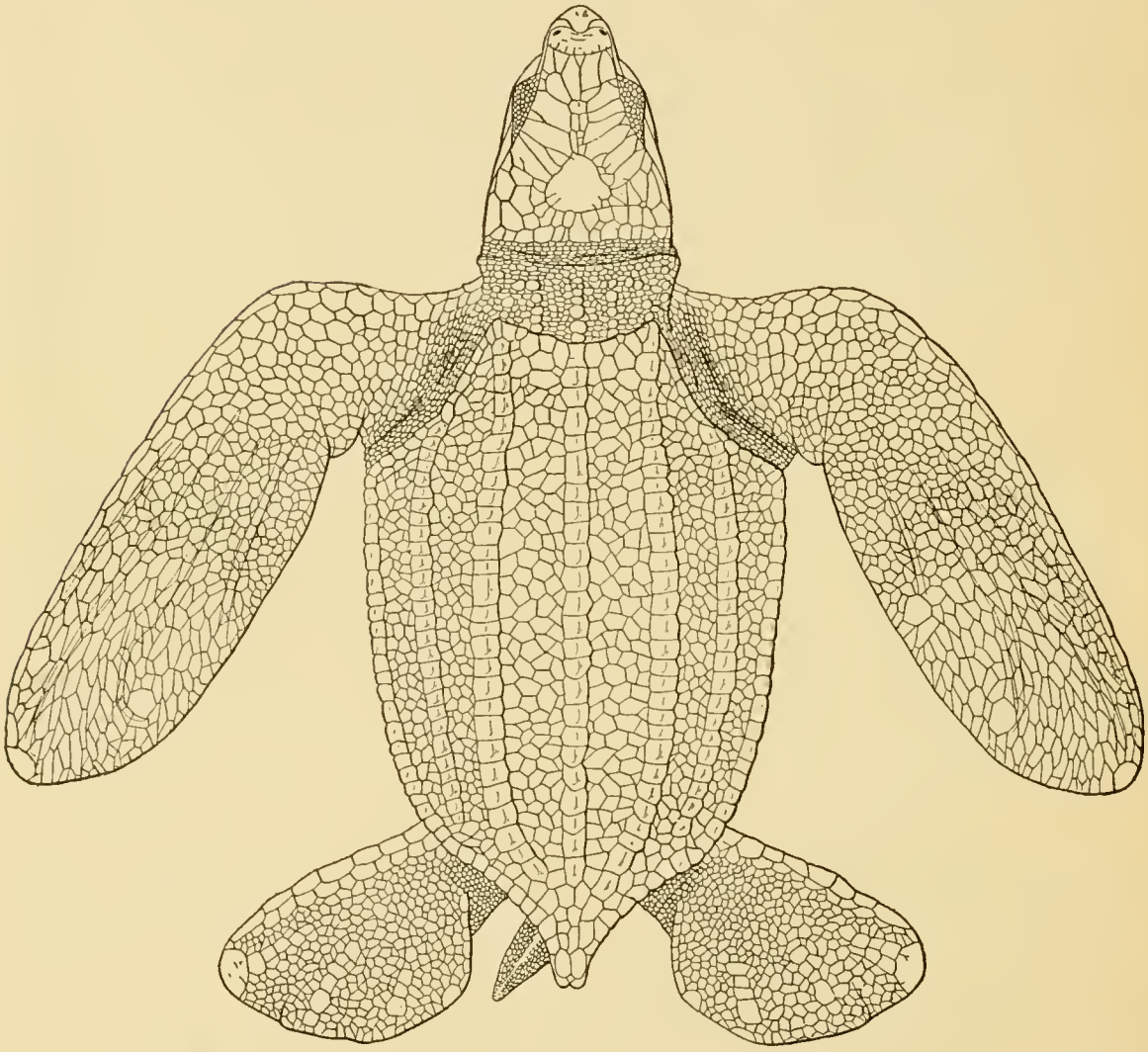


Fig. 175.—Dermochelys coriacea, young. Natural size. Entire animal from above. No. 19796, U.S.N.M.

Soc. Españ. Hist. Nat., IV, 1875, p. 351 (Cuba); X, 1881, p. 307 (Porto Rico); Contr. Erpet. Cubana, 1880, p. 18 (Cuba).—Bello y Espinosa, Zool. Garten, XII, 1871, p. 351 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, p. 68 (Dorado, Porto Rico).—Garman, Bull. U. S. Nat. Mus. No. 25, 1884, pp. 287, 303 (Bermudas; tropical and temperate portions of the Atlantic).—*Dermochelys coriacea* Boulenger, Cat. Chel. Brit. Mus., 1889, p. 10 (part).

1788. *Testudo lyra* Lacépède, Hist. Nat. Quadr. Ovip. Serp., I, Syn. meth.—Bonnaterre, Tabl. Encycl. Erpét., 1789, p. 22, pl. IV, fig. 2.

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[a] Latin=leathery.

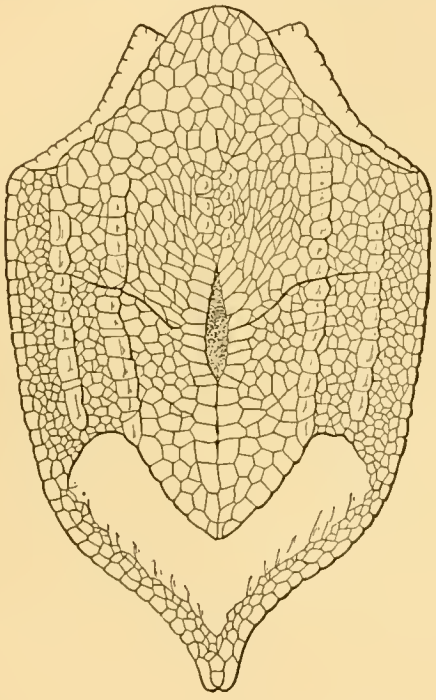
1814. *Chelonias lutaria* RAFINESQUE, Specchio d. Sci. (Palermo), II, No. 9, 1 Sett. 1814, p. 66 (Mediterranean).

1820. *Sphargis mercurialis* MERREM, Syst. Amph., p. 19 (Mediterranean and Atlantic).

1829. *Sphargis tuberculata* GRAVENHORST, Delic. Mus. Vratislav., p. 9.

No Porto Rican specimen of the great Leatherback turtle being at hand, a detailed description of the species seems superfluous, as it can readily be identified from the general key to the turtles given above. The young can easily be recognized from the appended figures (figs. 175–178).

This truly oceanic species comes occasionally to the coasts of Porto Rico with the intention of depositing its eggs in the sand. Thus Bello y Espinosa reports that on April 19, 1869, a grown female was



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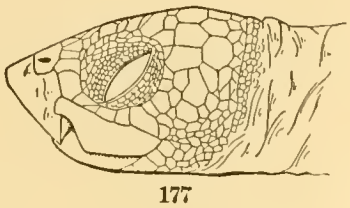

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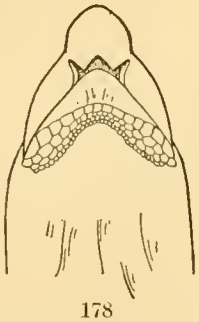

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FIGS. 176–178.—DERMOCHELYS CORIACEA, young. Natural size. 176, underside of shell; 177, side of head; 178, underside of head. No. 19796, U.S.N.M.

caught, though he does not give the locality. It measured 2.08 meters over the curvature of the carapace. The color was of a plumbeous gray, with numerous small whitish spots; head and feet somewhat darker gray, the latter with whitish spots, the former with dark spots. It contained a large number of eggs.

It may be this same individual to which Dr. Stahl refers. He reports that in the playa of Dorado a "tinglado" was seen coming out of the sea; it immediately dug a pit, in which it deposited in a few moments 78 eggs.

Genus PSEUDEMYS[a] Gray.

1855. *Pseudemys* Gray, Cat. Shield Rept. Brit. Mus., p. 33 (type *P. concinna*).
1857. *Ptychemys* Agassiz, Contr. Nat. Hist. U. S. Amer., I, p. 431 (type *P. rugosa* Gray) (not of Pomel).
1857. *Trachemys* Agassiz, Contr. Nat. Hist. U. S. Amer., I, p. 434 (type *T. scabra*).
1857. *Nectemys* Agassiz, Contr. Nat. Hist. U. S. Amer., II, p. 642 (substitute for *Ptychemys*, preoccupied).
1889. *Chrysemys* Boulenger, Cat. Chel. Brit. Mus., p. 69 (part).

The fresh-water turtles are but scantily represented in the West Indian region. In fact, the only indigenous Emydine species found in any of the Antilles is the one belonging to the present genus, which is represented in North and Middle America by numerous species.

PSEUDEMYS PALUSTRIS[b] (Gmelin).

1788. *Testudo palustris* Gmelin, Syst. Nat., I, iii, p. 1041 (type locality, Jamaica).
1788. *Testudo terrapen* Lacépède, Hist. Nat. Quadr. Ovip. Serp., I, Syn. meth. between pp. 618 and 619 (type locality, Jamaica) (not *T. terrapin* Schöpf 1792).—Bonnaterre, Tab. Encycl. Erpét., 1789, p. 30.
1802. *Testudo rugosa* Shaw, Gen. Zool., III, i, p. 28, pl. iv (type locality, unknown) (not of Daudin, 1803).—*Emys rugosa* Cocteau, in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, Rept., p. 17; Atlas, Rept., pl. ii (1838) (Cuba); French ed. (p. 11).—Gosse, Nat. Soj. Jamaica, 1851, p. 189 (Jamaica).—Gundlach, in Poey's Repert. Fisico-Nat. Cuba, II, No. 5, April, 1867, p. 104 (Cuba); Anal. Soc. Españ. Hist. Nat., IV, 1875, p. 349 (Cuba); X, 1881 (p. 307) (Porto Rico), Contrib. Erpet. Cubana, 1880, p. 9 (Cuba).—Vilaró, in Poey's Repert. Fisico-Nat. Cuba, II, No. 5, April, 1867, p. 120.—Sowerby and Lear, Tort., 1872 (pls. xlii–xliii).—Stahl, Fauna Puerto-Rico, 1882, p. 68 (Porto Rico).—Garman, Proc. Amer. Philos. Soc., XXIV, 1887, p. 286 (San Juan, Porto Rico, Cuba).—*Trachemys rugosa* Agassiz, Contr. Nat. Hist. U. S. Amer., I, 1857, p. 436 (Habana).—Gray, Suppl. Cat. Shield Rept. Brit. Mus., 1870, p. 48 (Cuba).
1831. *Emys decussata* Gray, Synops. Rept., p. 28 (type locality, "America borealis"); Cat. Shield Rept. Brit. Mus., 1855, p. 30.—Griffith, Cuvier's Anim. Kingd., IX, 1831, pl. opp. p. 76.—Bell, Monogr. Testud., Pts. 4–5, 1835, p.— (pl. vi).—Duméril and Bibron, Erpét. Gén., II, 1835, p. 279 (Santo Domingo; Ricord coll.).—Cocteau, in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, 1838, Rept., p. 14; French ed. (p. 6); Atlas, Rept., pl. i (Cuba).—Duméril, Cat. Méth. Rept. Mus. Paris, I, 1851, p. 11 (Santo Domingo, Cuba, Guadeloupe).—Gosse, Nat. Soj. Jamaica, 1851, p. 187 (Jamaica).—Reinhardt and Luetken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862 (1863), p. 290; author's separate p. 138 (Santo Domingo).—*Ptychemys d.* Agassiz, Contr. Nat. Hist. U. S. Amer., I, 1857, p. 434 (Habana).—*Clemmys d.* Strauch, Chenol. Studien, 1862 (p. 33); Mém. Ac. Sci. St. Pétersb., (7) XXXVIII, No. 2, 1890, p. 78 (Port au Prince, Haiti).—Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 705 (Porto Rico).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 307 (Porto Rico).—*Pseudemys d.* Gray, Suppl. Cat. Shield Rept. Brit. Mus., 1870, p. 47.

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[a] ψευδής, false; ἐμύς, fresh-water turtle. [b] Latin=living in swamps.

1844. *Emys vermiculata* GRAY, Cat. Tort. Brit. Mus., p. 25 ("tropical America"); Cat. Shield Rept. Brit. Mus., 1855, pl. XIII.

1861. *Emys jamao* DUMÉRIL, Arch. Mus. d'Hist. Nat. Paris, X, 1861, pp. 435, 445 (Habana; *nomen nudum*).—VILARÓ, in Poey's Repert. Fisico-Nat. Cuba, II, No. 6, May, 1867, p. 121; No. 10, Nov., 1867, p. 228.

1867. *Emys gnatho* VILARÓ, in Poey's Repert. Fisico-Nat. Cuba, II, No. 9, Oct., 1867, p. 204 (Cuba).

1889. *Chrysemys scripta* var. *rugosa* BOULENGER, Cat. Chel. Brit. Mus., p. 79 (Santo Domingo, Jamaica).

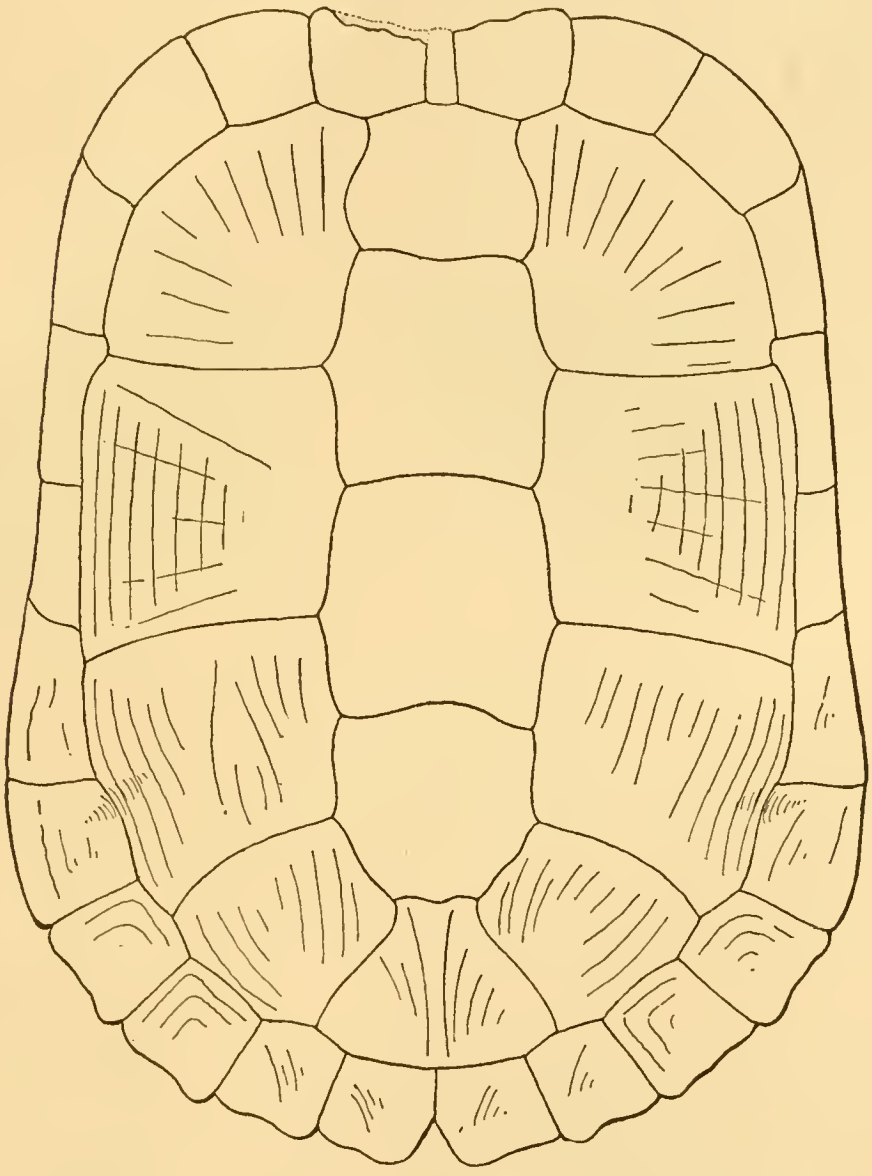
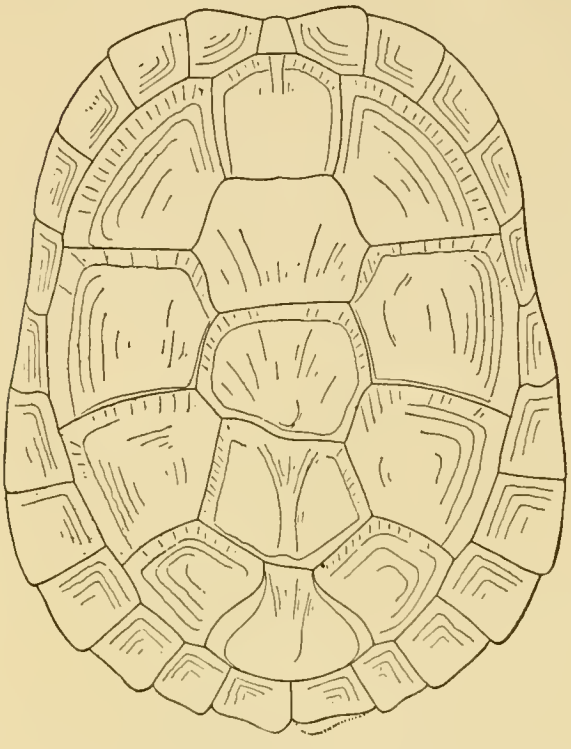


FIG. 179.—PSEUDEMEYS PALUSTRIS, adult. ½ natural size. Shell from above. No. 25642, U.S.N.M.

Description.—Adult female; U.S.N.M. No. 25642; San Juan; January 14, 1899. Shell moderately convex, the height being more than one-half the greatest width; length of carapace less than two and a half times the height of the shell and about one and one-third times its greatest width; carapace faintly keeled and with longitudinal wrinkles crossed by radiating ridges, which are especially strong on the anterior costals; nuchal narrow; first vertebral shield urceolate, anterior and posterior sutures of same length; lateral sutures of second, third, and

fourth vertebrals much longer than the anterior and posterior sutures; vertebrals much narrower than costals; posterior margin of carapace slightly serrate, each of four posterior marginals on each side being faintly emarginate; carapace broader behind than in front, the posterior marginals flaring out considerably; plastron less than two-thirds and



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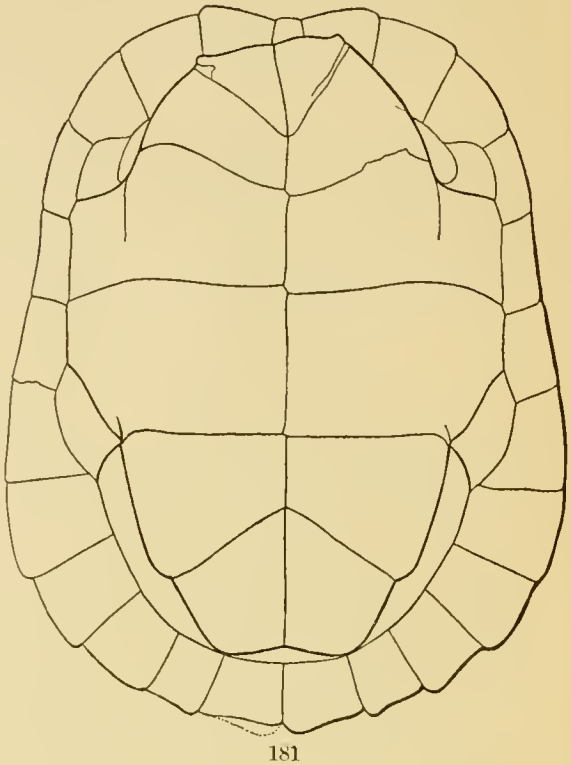

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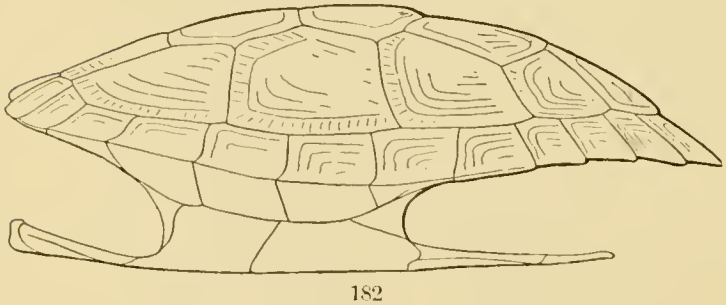

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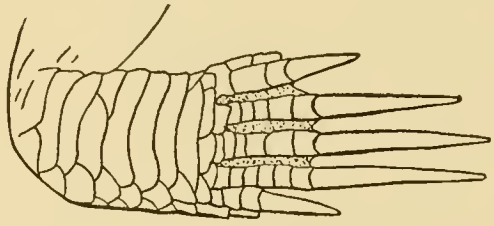

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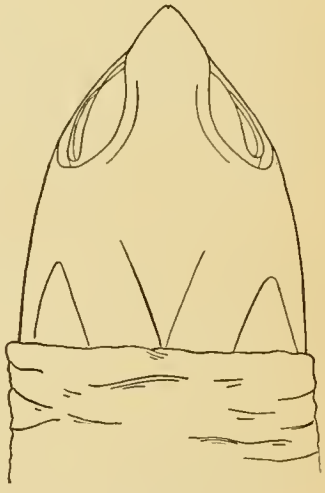

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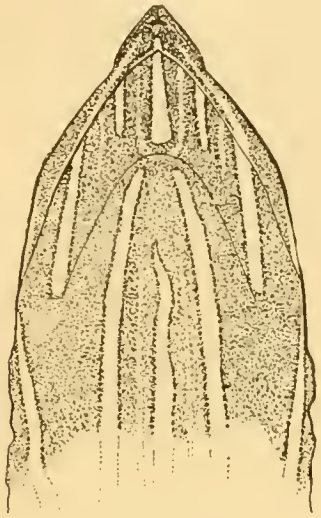
FIGS. 180–184.—PSEUDEMYS PALUSTRIS, young. 180, shell from above; 181, shell from below; 182, shell from side. ½ natural size. 183, top of head. 1½ × natural size. 184, upper side of fore foot. Natural size. No. 25643, U.S.N.M.

more than one-half the greatest width of the carapace; the posterior lobe a trifle wider than the anterior, its length much less than the width of the bridge; abdominal suture longest, equaling those of the pectorals and femorals together; humeral suture shortest; gulars projecting, cut off square anteriorly; plastron slightly emarginate behind;

axillars and inguinals large, latter largest; head moderate; snout short, pointed, feebly projecting; upper jaw with a very slight median notch, no cusps; jaws feebly denticulated; alveolar surface broad, with a deep notch behind on the median line; symphysis of mandible as broad as one-half the longest diameter of the orbit; digits connected with broad webs. Color (in alcohol) of carapace above nearly uniform tawny olive; plastron yellowish, with obscure dusky symmetrical sinuous markings all over; top of head without markings; yellowish lines narrowly edged with blackish on sides and under surface of head and neck, one from the nostrils crossing the upper jaw obliquely and ending abruptly at the posterior angle of the mandible, another from



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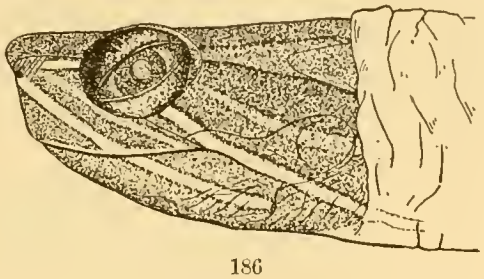

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FIGS. 185–186.—PSEUDEMYS PALUSTRIS, young. Color pattern of head; 185, underside; 186, side. 1½ × natural size. No. 25643, U.S.N.M.

above the nostrils, crossing the eye to the lower posterior edge of the orbit, and thence obliquely down and backward to the corner of the mouth, continuing backward under the tympanum down the side of the neck; two fainter lines, one between the two just described and one above the transocular line, crossing the tympanum; a line on the symphysis of the mandible bifurcating on the chin and a third median line originating on the chin a short distance behind the fork, the three continuing parallel down the under side of the neck; two similar but wider lines on the upper side of the fore legs and two on the under side of the hind legs.

Dimensions.

	mm.
Length of carapace	232
Width of carapace anteriorly	150
Width of carapace posteriorly	170
Height of shell	95
Width of anterior plastral lobe	90
Width of posterior plastral lobe	93
Width of bridge	88
Width of head	31

Variation.—The younger specimens have a more pronounced median keel on the carapace; the nuchal is wider, especially in front; first vertebral with longer anterior suture than the posterior and straight lateral sutures; the vertebrals are wider than long, nearly as wide as or, in the smallest specimen, even wider than the costals; the wrinkles and ridges are also stronger. The color above is darker, and some pale but obscure crossbars may be seen; two of the specimens have the marginal and costal sutures widely edged with a broad pale margin; the dusky markings on the plastron are more distinct; the symphyseal median pale line and the two lateral throat lines do not meet so as to form a fork.

Habitat.—The present species is recorded from Jamaica, Cuba, Haiti, and Porto Rico. There are indications at hand that there may be some constant differences between those inhabiting the different islands, but the material at my disposal is not sufficient to warrant an attempt to separate them.

In Porto Rico the species is found apparently sparingly in streams and ponds in the lowlands.

List of specimens of Pseudemys palustris.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
25642	Adult female.	San Juan, Porto Rico.....	Jan. 14, 1899	U. S. F. C. Fish Hawk expedition.	Fig. 179.
25643	Young.....	.....do.....	.....do.....	.....do.....	Figs. 180–186.
25644	.....do.....	.....do.....	.....do.....	.....do.....	
25653	.....do.....	Caguas, Porto Rico.....	Jan. 9, 1899	.....do.....	

Genus CARETTA[a] Rafinesque.

1814. *Caretta* Rafinesque, Specchio d. Sci. (Palermo), II, no. 9, 1 Sett., 1814, p. 66 (type *C. nasuta*=*Testudo caretta*).

1836. *Thalassochelys* Fitzinger, Ann. Wien Mus., I, 1835, p. 121, (type *Testudo caouana*=*T. caretta*).

1838. *Caouana* Cocteau, in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, Rept., p. 31 (type *Chelonia cephalo*=*T. caretta*).

The generic name *Caretta* is usually credited to Merrem, 1820, and because Ritgen in 1828 limited it to *C. imbricata* it has often been given the precedence over *Eretmochelys* of Fitzinger. This is a mistake, however, for Rafinesque, as early as 1814, not only established the generic term, but limited it to the species he called *C. nasuta*, which is nothing but the *Testudo caretta* of Linnæus, the Atlantic Loggerhead.

[a] The name Caret (New Latin *Caretta*) according to Lacépède is the one by which the hawksbill turtle is generally known in the countries it inhabits. The derivation from cara, face, is doubtful. Carey is Spanish for tortoise shell.

CARETTA CARETTA (Linnæus).

1758. *Testudo caretta* Linnæus, Syst. Nat., 10th ed., I, p. 197 (type locality, "ad insulas Americanas"); 12th ed., 1766, p. 351.—Wahlbaum, Chelonogr., 1782 (p. 95) (St. Croix l., West Indies).—*Chelonia c.* Gravenhorst, Delic. Mus. Vratislav., 1, 1829 (p. 7).—Reinhardt and Luetken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862, p. 286; author's separate p. 134 (Virgin Islands?).—Gundlach, in Poey's Rep. Fis.-Nat. Cuba, II, No. 5, Apr., 1867, p. 105 (Cuba); Anal. Soc. Españ. Hist. Nat., IV, 1875, p. 350 (Cuba); Contrib. Erpet. Cubana, 1880, p. 17 (Cuba).—Stahl, Fauna Puerto-Rico, 1882, p. 68 (Porto Rico).

1783. *Testudo cephalo* Schneider, Allg. Naturg. Schildkr., (p. 303).—*Chelonia c.* Temminck and Schlegel, Fauna Jap. Rept., 1838, pl. iv, figs. 1–3 (Surinam).—*Chelonia* (*Caouana*) *c.* Cocteau, in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, Rept., 1838, p. 31; French ed. (p. 35) (Cuba).—Lacépède, Hist. Nat. Quadr. Ovip. Serp., I, 1788, Syn. meth.

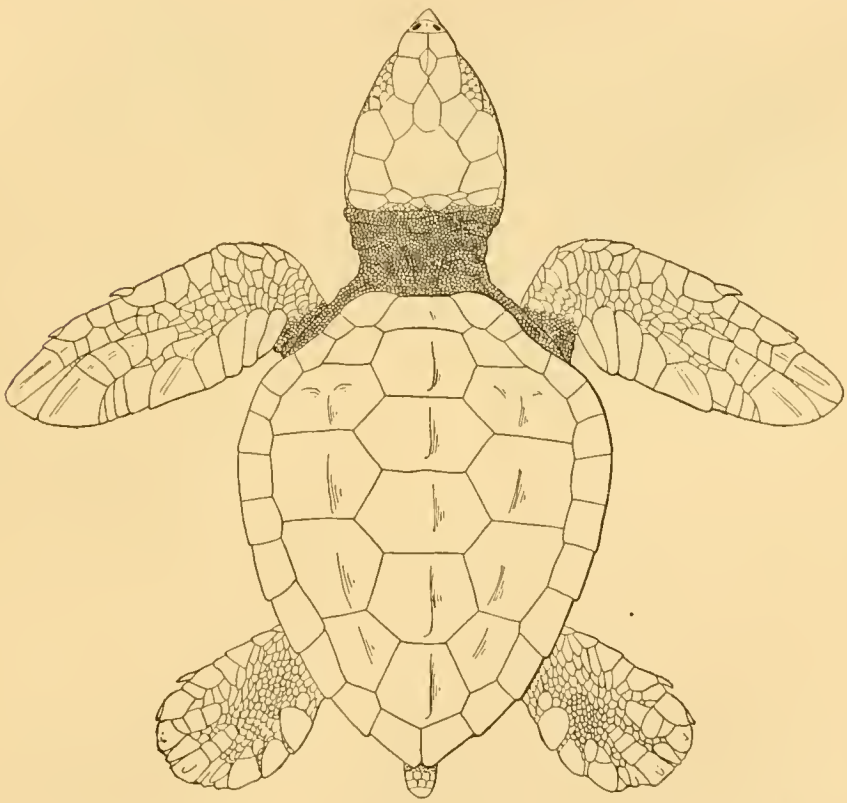


Fig. 187.—Caretta caretta, young. Florida. Natural size. Entire animal from above. No. 14823. U.S.N.M.

1788. *Testudo caouana* Bonnaterre, Tabl. Encycl. Erpét., 1789, p. 20 (warm countries of old and new continent; Jamaica, Mediterranean).—*Chelonia c.*—Duméril and Bibron, Erpét. Gén., II, 1835, p. 553.—Duméril, Cat. Méth. Rept. Mus. Paris, I, 1851, p. 25 (Martinique).—*Thalassochelys c.* Agassiz, Contr. Nat. Hist. U. S. Amer., I, 1857, p. 384 (West Indies: Bahamas to Trinidad).—Garman, Bull. U. S. Nat. Mus., No. 25, 1884, pp. 287, 300 (tropical Atlantic; Bermudas).

1814. *Caretta nasuta* Rafinesque, Specchio d. Sci. (Palermo), II, no. 9, 1 Sett., 1814, p. 66 (new name for *Testudo caretta* Linnæus).

1814. *Chelonia caouanna* Schweigger, Prodr. Mon. Chel., p. 22 (Sardinia, West Indies).

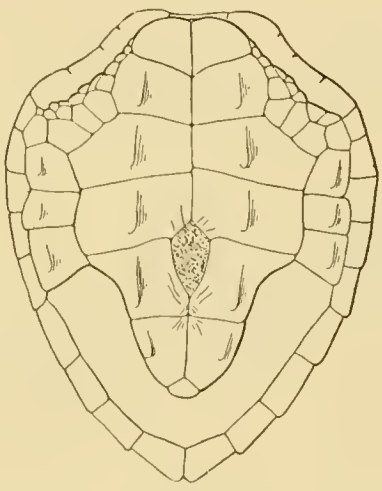
1816. *Chelonia caranna* Oken, Lehrb. Zool., II, p. 350 (West Indies, Mediterranean).

1833. *Chelonia virgata* Wagler, Descr. Icon. Amph., Pt. 3, pl. xxix (not of Schweigger, 1814).

1858. *Thalassochelys corticata* Girard, Herpet. U. S. Expl. Exp., p. 431, pl. xxix, figs. 1–4 (Madeira).

The Loggerhead turtle is readily distinguished from the other marine turtles by having five pairs of costal shields, while the other two species with horny covering have only four pairs. The additional pair is situated in front of the others, in contact with the first vertebral. No Porto Rican specimen being at hand, a young one from Florida is figured herewith, so as to help in identifying specimens.

This species is included in the Porto Rican fauna on the strength of Dr. Stahl's testimony. It is probably not rare, but being of no commercial value it attracts no attention.



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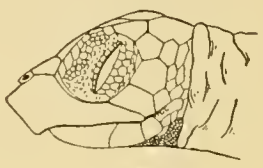

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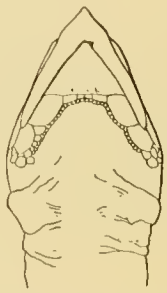

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Figs. 188–190.—Caretta caretta, young. Florida. Natural size. 188, shell from below; 189, head from side; 190, underside of head. No. 14823, U.S.N.M.

Genus CHELONIA[a] Latreille.

1800. *Chelonia* Brongniart, Bull. Soc. Philom. Paris, II, p. 89 (*nomen nudum*).

1802. *Chelonia* Latreille, Hist. Nat. Rept., I, p. 22 (type *C. mydas*).

1806. *Chelone* Brongniart, Mém. Sav. Étrang., I, p. 610 (emended).

1814. *Chelonias* Rafinesque, Specchio d. Sci. (Palermo), II, no. 9, 1 sett. 1814, p. 66 (emended).

1838. *Mydas* Cocteau in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, Rept., p. 22 (type *Ch. viridis*) (not of Fabricius 1799).

1843. *Mydasea* Gervais, Dict. d'Hist. Nat., III, p. 457 (same type).

1848. *Megemys* Gistel, Naturg. Thierr., p. viii (substitute for *Chelonia*).

CHELONIA MYDAS[b] (Linnæus).

1758. *Testudo mydas* Linnæus, Syst. Nat., 10th ed., I, p. 197 (Ascension Island, etc.); 12th ed., I, 1766, p. 350.—*Chelone m.* Brongniart, Mém. Sav. Étrang., I, 1806, p. 611.—Boulenger, Cat. Chel. Brit. Mus., 1889, p. 180, (part: Belize, West Indies).—*Chelonia m.* Schweigger, Arch.

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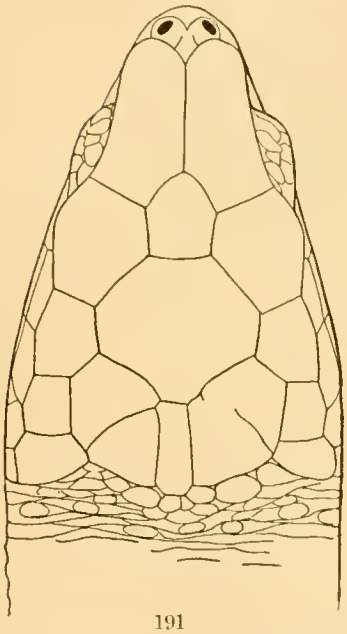
[a] χελώνη, turtle.

[b] Mydas, said to be a corruption for ἐμύς, ἐμυδος, a turtle (from μυδαω, am wet?)

Koenigsb., I, 1812 (p. 412); Prodr. Mon. Chel., 1814, p. 22.—Gundlach, Contr. Erpet. Cubana, 1880, p. 16 (Cuba).—Garman, Bull. U. S. Nat. Mus. No. 25, 1884, pp. 287, 301 (tropical Atlantic, Bermudas); Proc. Amer. Philos. Soc., XXIV, 1887, p. 286 (Leeward Islands).—Evermann, Bull. U. S. Fish Comm., 1900, p. 25 (Porto Rico).

1783. *Testudo viridis* Schneider, Allg. Naturg. Schildkr., (p. 309, pl. II).—Latreille, Hist. Nat. Rept., I, 1802, p. 48.—*Chelonia v.* Temminck and Schlegel, Fauna Japon., Rept., 1838, p. 18 (part).—Reinhardt and Lütken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862 (1863), p. 289; author's separate p. 137 (West Indies, Madeira).—Gundlach in Poey's Repert. Fisico-Nat. Cuba, II, No. 5, Apr., 1867, p. 105 (Cuba); Anal. Soc. Españ. Hist. Nat., IV, 1875, p. 350 (Cuba); X, 1881, p. 307 (Porto Rico).—Stahl, Fauna Puerto-Rico, 1882, p. 68 (Porto Rico).



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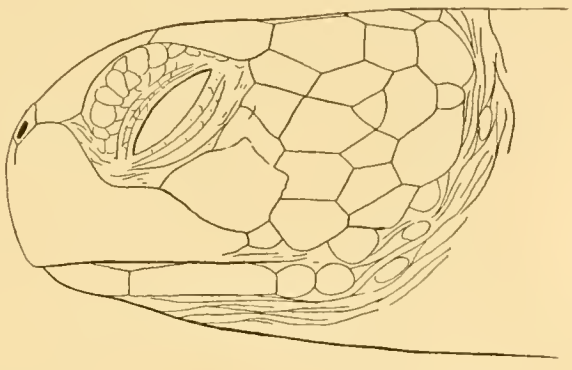

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Figs. 191-192.—Chelonia mydas. Florida. ⅔ natural size. 191, top of head; 192, side of head. No. 21405, U.S.N.M.

1788. *Testudo viridi-squamosa* Lacépède, Hist. Nat. Quadr. Ovip. Serp., I, Syn. meth.—Bonnaterre, Tabl. Enc. Erpét., 1789, p. 20 ("La mer du Sud, le golfe du Mexique, les rivages du Nouveau-Monde").

1800. *Testudo chloronotos* Bechstein, Lacépède's Naturg. Amph., I, p. 107 (Mexican Gulf).

1800. *Testudo marina* Bechstein, Lacépède's Naturg. Amph., II, p. 529.

1816. *Chelonia gigas* Oken, Lehrb. Zool., II, p. 351 (part).

1820. *Caretta esculenta* Merrem, Syst. Amph., p. 18 (Atlantic Ocean).

1830. *Chelonia midas* Wagler, Nat. Syst. Amph., p. 133.—Duméril and Bibron, Erpét. Gén., II, p. 538 (Atlantic Ocean).

1835. *Chelonia marmorata* Duméril and Bibron, Erpét. Gén., II, p. 546 (Ascension Island).

1838. *Chelonia* (*Mydas*) *virgata* Cocteau, in Sagra's Hist. Fis. Pol. Nat., Cuba, IV, Rept., p. 25 (part: Santo Domingo, Cuba) (not of Schweigger).—Gundlach in Poey's Repert Fisico-Nat. Cuba, II, No. 5, Apr., 1867, p. 105; Anal. Soc. Españ. Hist. Nat., IV, 1875, p. 350 (Cuba); Contr. Erpet. Cubana, 1880, p. 16 (Porto Rico).

1884. *Chelonia mydas* var. *marmorata* Garman, Bull. U. S. Nat. Mus., No. 25, p. 302.

The green turtle is easily distinguished from the other Porto Rican marine turtles by the single pair of elongated prefrontal shields on top of the snout. The shell alone can be recognized by having only four costal shields and by the shields not overlapping posteriorly. The loggerhead (*Caretta caretta*) has five costal shields, while the hawksbill (*Eretmochelys imbricata*) has overlapping shields (fig. 193).

None of our expeditions to Porto Rico brought back any specimens of the green turtle, but its occurrence in the waters surrounding the

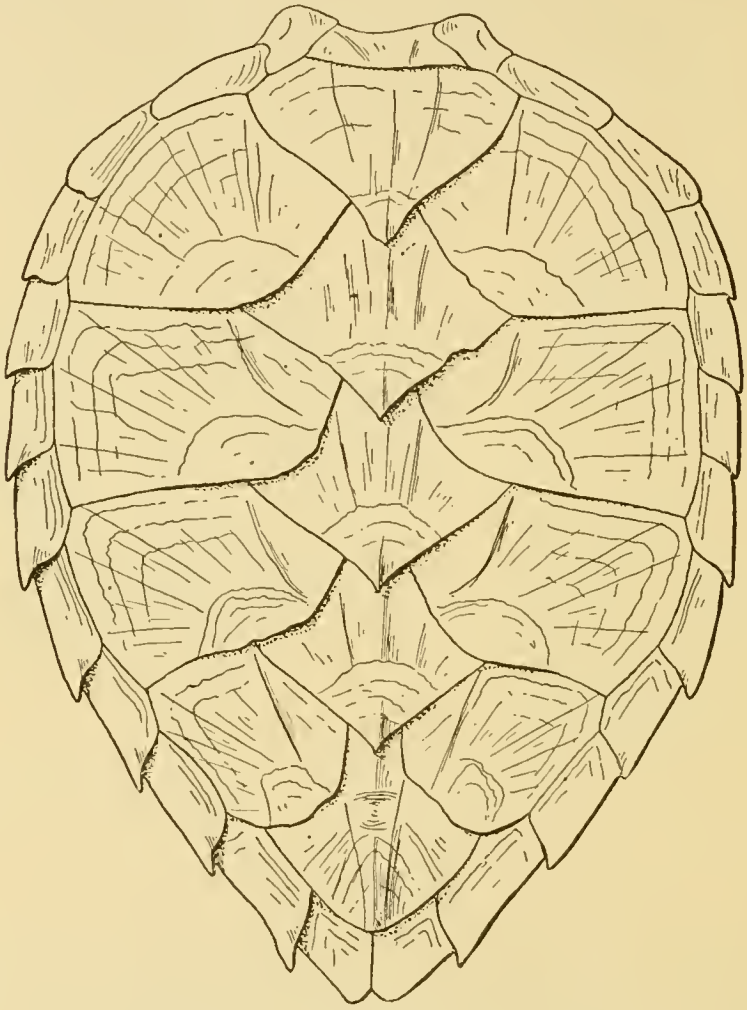

FIG. 193.—ERETMOCHELYS IMBRICATA. ¼ natural size. Shell from above. No. 25645, U.S.N.M.

island is well known. Dr. B. W. Evermann, in his general report on the investigations in Porto Rico of the United States Fish Commission steamer *Fish Hawk* in 1899, writes that it is rare except at the east end of the island, and he accounts for the scarcity of turtles by the absence of large areas of shallow water with sandy bottom.

Genus ERETMOCHELYS[a] Fitzinger.

1828. *Caretta* RITGEN, Nova Acta Acad. Cæs. Leop., XIV, p. 270 (type, *Chelonia imbricata;* not of Rafinesque, 1814).

1843. *Eretmochelys* FITZINGER, Syst. Rept., p. 30 (same type).

1873. *Onychochelys* GRAY, Proc. Zool. Soc. London, 1873, p. 397 (type, *O. kraussi*).

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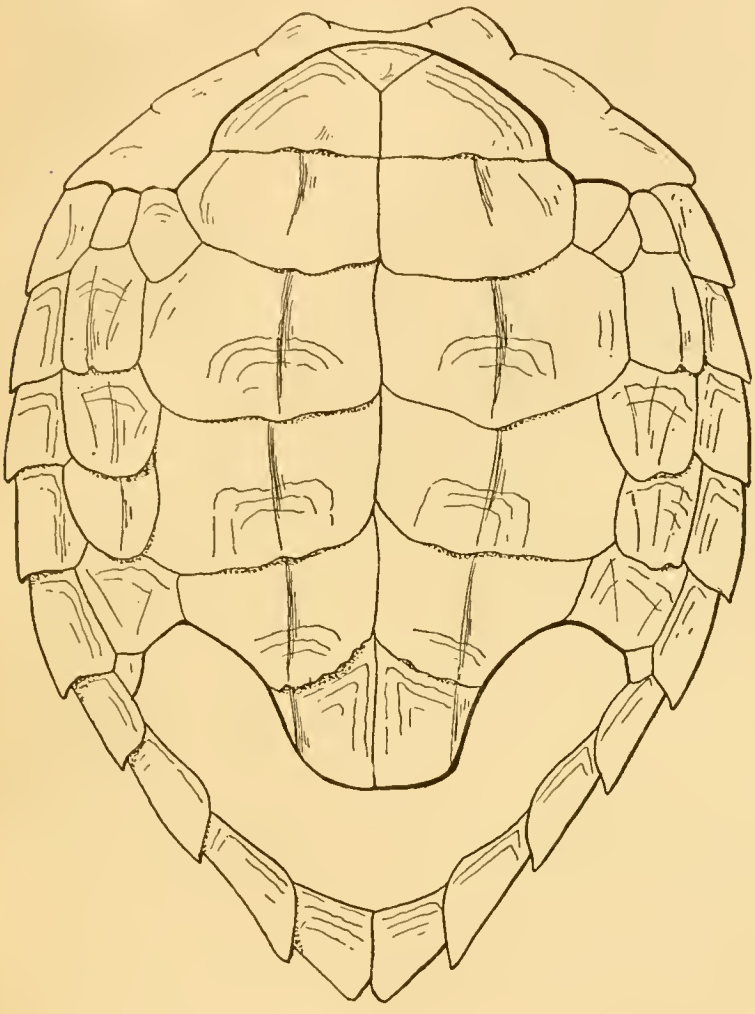
[a] *ἐρετμόν*, oar; *χέλυς*, turtle.

As has been stated above, the generic term *Caretta* was employed by Rafinesque as early as 1814 for the loggerhead turtle. Its subsequent use by Ritgen, Gray, and others is consequently unwarranted, and the next one in time, Fitzinger's *Eretmochelys*, must be accepted as the genus name for the hawksbills.



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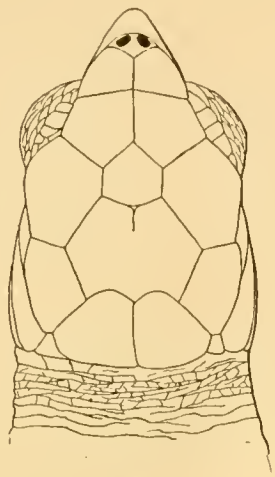

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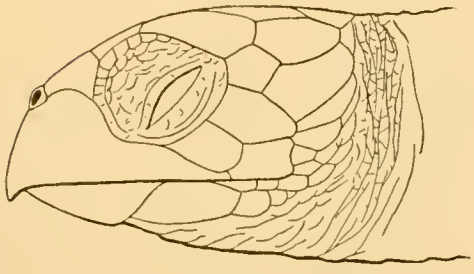

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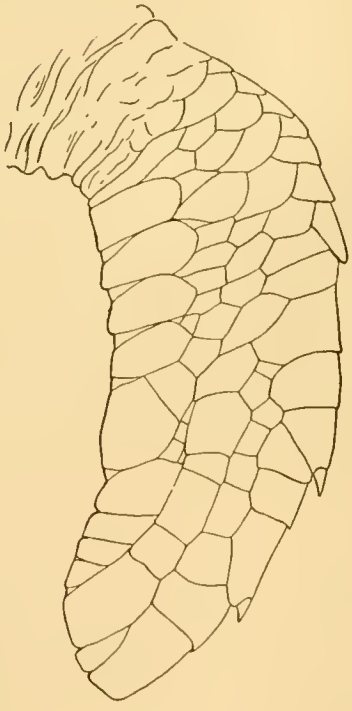

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FIGS. 194–197.—ERETMOCHELYS IMBRICATA. 194, shell from below. ½ natural size. 195, top of head; 196, side of head; 197, right fore flipper, dorsal view. ⅔ natural size. No. 25645, U.S.N.M.

ERETMOCHELYS IMBRICATA [a] (Linnæus).

1766. *Testudo imbricata* LINNÆUS, Syst. Nat., 12th ed., I, p. 350 (American seas).—*Chelonia i.* SCHWEIGGER, Prodr. Mon. Chel., 1814, p. 21.—DUMÉRIL and BIBRON, Erpét. Gén., II, 1835, p. 547, pl. XXIII, figs. 2–2*b* (Habana,

[a] Latin=imbricated, overlapping like shingles.

Choris, coll.).—Holbrook, N. Amer. Herpet., 2d ed., II, 1842, p. 39, pl. v (coast of Carolina).—Reinhardt and Lütken, Vid. Meddel. Naturh. Foren. (Copenhagen), 1862 (1863), p. 286; author's separate, p. 134 (St. Thomas).—Gundlach, in Poey's Repert. Fisico-Nat. Cuba, II, No. 5, Apr., 1867, p. 105 (Cuba); Anal. Soc. Españ. Hist. Nat., IV, 1875, p. 350 (Cuba); Contrib. Erpet. Cubana, 1880, p. 17 (Cuba).—Stahl, Fauna Puerto-Rico, 1882, p. 68 (Porto Rico).—*Caretta imbricata* Merrem, Syst. Amph., 1820, p. 19.—Girard, Herpet. U. S. Expl. Exp., 1858, pp. 439, 440 (West Indies).—Gundlach, Anal. Soc. Españ. Hist. Nat., X, 1881, p. 307 (Porto Rico).—*Chelonia* (*Caretta*) *imbricata* Cocteau, Hist. Fis. Pol. Nat. Cuba, IV, Rept., 1838, p. 27 (Cuba).—*Eretmochelys imbricata* Agassiz, Contr. Nat. Hist. U. S. Amer., I, 1857, p. 381 (West Indies, Key West, Little Antilles, Jamaica, Cayman Islands).—Garman, Bull. U. S. Nat. Mus., No. 25, 1884, pp. 287, 299 (Bermuda).—Evermann, Bull. U. S. Fish Comm., 1900, p. 25 (Porto Rico).—*Chelone imbricata* Strauch, Chenol. Studien, 1862 (p. 181) (part).—Boulenger, Cat. Chel. Brit. Mus., 1889, p. 183 (part: Bahamas; Guatemala, French Guiana, Tehuantepec).

1788. *Testudo caretta* Lacépède, Hist. Nat. Quadr. Ovip. et Serp., I, Syn. meth.—Bonnaterre, Tabl. Enc. Erpét., p. 21, pl. iv, fig. 1 (part) (not of Linnæus).—Daudin, Hist. Nat. Rept., II, 1803, p. 39, pl. xvii, fig. 2 (near the Atlantic islands and coast of America, Cayman Islands, Jamaica).

1873. *Onychochelys kraussi* Gray, Proc. Zool. Soc. London, 1873, p. 398, figs. (type locality, French Guiana; types in Brit. Mus.; Dr. Krauss coll.).

The hawksbill, which furnishes the valuable "tortoise shell," is superficially characterized by the horny plates on its back overlapping with their posterior borders after the fashion of fish scales or shingles. The accompanying illustrations (figs. 193–197), which are from a Porto Rican specimen less than half grown, give a fair idea of the external characters by which this species is distinguished from the other marine turtles frequenting the same waters.

The U. S. Fish Commission *Fish Hawk* expedition brought home several young specimens from Mayaguez, but Professor Evermann writes that this species, like the green turtle, is rare except at the eastern end of the island.

List of specimens of Eretmochelys imbricata.

U.S. N.M. No.	Age.	Locality.	When collected.	By whom collected.	Remarks.
25645	Young..	Mayaguez, Porto Rico.....	Jan. 20, 1899	U. S. F. C. Fish Hawk expedition.	Figs. 194–197.
25646	....do...	.....do.....	.....do.....	.....do.....	
25647	....do...	.....do.....	.....do.....	.....do.....	

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